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JIPDEC is a non-profit organization founded in 1967 with the support of the Ministry of International Trade and Industry, the Ministry of Posts and Telecommunications and related industry circles, for the purpose of promoting information processing and the information processing industry in Japan.

NOTE: The opinions expressed by the various contributors to the JIPDEC informatization Quarterly do not necessarily reflect those views held by JIPDEC.

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From the Editor

Public and private sectors in Japan once made concerted effort to advance informatization of the society in order to raise the level of Japanese information environment to the level of the United States. The united effort succeeded in bringing our information environment to the level of the West by the late 1980s. In certain technnological areas, Japan has come to boast the highest standards in the world. In the late 1980s, information investment in the private sector increased at the annual rate of 25 percent. The ratio exceeded the real GNP growth ratio by a wide margin. However, information investment in the private sector began to decrease sharply at the beginning of 1990s under direct adverse effects of a recession caused by the burst of the bubble economy. In 1992, the value of such investment dropped by 10 percent. Meanwhile, in the United States, information investment in the private sector has continued to surpass real GNP in year-to-year growth ratio since 1988, and been growing at particularly high ratios since 1990. These data suggest different corporate responses to the changing business environment caused the information gap between Japan and the United States to widen again in the first half of the 1990s. U.S. companies made their activities more efficient with active information investment. This resulted in a positive cycle of demand and supply. On the other hand, Japanese companies curbed information investment primarily in response to a revenue drop. This action led to stagnation of the entire economy and caused them to reduce investment further.

Accelerating informatization of the society and the production overseas are now causing labor surplus in Japan. This circumstance is raising Japanese employees' sense of crisis. Advances in information and commiunications technologies have enabled the mankind to shift their time to more creative and more intelligent types of work, demanding the quality

of labor to change. The Japanese economy is currently struggling to find it way out of a structual slump created by the collapse of Japanese-style systems. This circumstance calls most strongly for such new industries that propel the market forward and vitalize the economy. The information and communications industry plays an important role in this respect.

The Japanese cabinet adopted the "action plan for the reform and creation of the economic structure" in May 1997. In the plan, the government stresses that enhancement of information and communications will be the driving force, to improve the productivity in all economic fields, thus reform the Japanese economy to have high additional values and save resources. The plan positions the time from the present to the year 2001 as the preparatory period for realizing a highly informatized society, and hopes to bring Japan's information and communications standards to highest levels in the world, by paying regard to the achievements of "basic guidelines for promoting a high-information, highly informatized society" adopted by the cabinet in 1994 and concentrating energies on the following due responses.

* Preparation of a Network Infrastructure

Digitized wired, wireless, mobile and fixed-site communications network infrastructures should be linked in a seamless manner to construct a "total digital network". Digitized broadcast networks should be also linked.

* Promotion of Electronic Commerce Transactions

Attempts should be made to realize on a full scale electronic commerce transactions (order placement and receipt, joint design and development) in all types of transactions, including those between Japanese companies and those between companies and consumers by the year 2001.

* Greater Informatization in the Public Sector (Development and Popularization of Public Applications)

Attempts should be made to actively

promote availability of information in such public areas as administration, education, research and development, medical treatment, transport and disaster prevention that are expected to advance informatization of the entire business community.

In this JIQ, I introduced the latest state of our country's information and communications industry by making exhaustive use of figures and tables. It will be my great pleasure if the information serves readers.

Yuji Yamadori
Director
Research & International Affairs

I. Executive Summary

1. General Conditions of the Information and Communications Industry

(1) Definition of the Information and Communications Industry Used in This Paper

Convergence of broadcasting and telecommunications has diversified people's opinions concerning the definition of the information and communications industry. In this paper, we would like to define the information and communications industry as the sum of the information service, electronic manufacturing and the telcommunications business. This definition excludes broadcasting. We quoted statistical data from the following sources – "Survey on the Selected Service Industries -- Information Service Industry" published by the Ministry of International Trade and Industry (MITI), "Industry Statistics" compiled by the MITI and "Developments in the Type I Telecommunications Business" prepared by the Ministry of Posts and Telecommunications (MPT). The first source provides figures concerning information service. The second document offers statistics on electronic manufacturing. The third material supplies data on telecommunications business. All these three documents contain data public offices have collected in a comprehensive manner according to applicable laws. As such, they are highly reliable.

(2) General Conditions of the Information and Communications Industry (from 1991 to 1996)

The burst of the bubble economy in 1991 gave hard blows to Japanese businesses. The information and communications industry was no exception. In fact, it was the information and communications industry that served as the driving force of business recovery. The industry could find stable demands in spite of the business slump because information and communications products and services were necessary to reduce cost and streamline business operations. Besides such unversal demands, the following factors gave the information and communications industry a strong following wind.

In September 1993, the U.S. administration led by President Bill Clinton announced the so-called NII (National Information Infrastructure) action plan. This U.S. announcement accelerated the pace with which the Japanese government prepares information and communications infrastructure in public domains. About the same time, the use of the Internet began to increase at an explosive pace among Japanese companies.

The second factor is explosive growth of the mobile telephone market that started with liberalization of cellular telephone terminals in April 1994. In July 1995, PHS (personal handyphone system) service was launched (refer to JIQ No. 102). The number of subscribers of Cellular phones and PHS have come to account for more than 20 percent of Japan's population. Mobile telephone subscribers are continuing to increase in number at the same high pace.

Thanks to favorable performances of Internet-related products and services and high sales of cellular phones and PHS, the information and communications industry achieved a big

growth in 1994 after hitting the bottom in 1993. Its growth exceeded that of other industries which were still struggling.

2. Position the Information and Communications Industry Occupies in Japanese Businesses

The animated state of the information and communications industry manifests in various government statistics published in 1997. We would like to quote major government statistics and inform the position the information and communications industry has come to occupy in Japanese businesses in the following.

(1) Machines and equipment related to information networks surpassed automobiles in the value of production

According to the "Present State of Japanese Industries" the MITI published in July 1997, Japanese manufacturers produced information and communications machines and equipment worth ¥17.3611 trillion in 1996. The amount represented an year-to-year increase of 12.7 percent. The figure also exceeded ¥16.653 trillion in annual automobile production, though the difference was very small. It was epochal for the industry to surpass the auto industry, Japan's leading industry. The achievement is significant despite the rising ratio of auto production overseas.

(2) The communications industry accounted for 10 percent of plant and equipment investment Japanese companies made in fiscal 1996.

According to the "Report on the Actual State of Plant and Equipment Investment in the Communications Field" the MPT published in June 1997 (based on its survey conducted in March 1997), plant and equipment

investment totaled ¥4.695 trillion among companies engaged in the communications business. The amount rose by 23.3 percent from the previous fiscal year. The figure accounted for more than 10 percent of the same investment all Japanese companies made in 1996. It was the first time for the industry to account for more than 10 percent of the entire investment. In fiscal 1997, communications companies are predicted to spend about the same amount on plant and equipment investment. The prediction is based on expected slowdown of the mobile telephone business. However, high spending on plants and equipment by companies operating in the business field remains the same. In fiscal 1997, investment by these companies is anticipated to account for 10 percent to 11 percent of the sum Japanese companies spend on plants and equipment.

(3) Telecommunications companies outrivaled electric power companies and led companies in all other categories in the value of machinery manufacturing orders.

According to the statistics on machinery orders the Economic Planning Agency released in May 1997, Japanese telecommunications companies placed machinery orders totaling ¥2.3242 trillion in fiscal 1996. This amount represented an year-to-year increase of 46.3 percent. Meanwhile, electric power companies issued machinery orders worth ¥2.0583 trillion. The amount decreased by 3.3 percent from the previous fiscal year's level. It was the first time for telecommunications companies to outrival power companies in machinery orders. This development owed substantially to an increase in the number of radio base stations. The increase was necessitated by rising popularity of cellular telephones and PHS. Earlier, in fiscal 1995, telecommunications compani-

es achieved an year-to-year machinery order growth of 26.5 percent. These figures show information and communications companies are leading the effort to stabilize our economy.

(4) Households owning personal computers grew to 22.3 percent. More than 60 percent of workers are using personal computers.

The ratio of information and communications machinery and equipment ownership does not reflect the postion companies manufacturing and selling them occupy in Japanese businesses in a direct manner. However, the ratio supports remarkable development of the information and communications industry. According to the "Fiscal 1996 Study on Telecommunications Equipment Use" the MPT published in April 1997, the ratio of households equipped with a personal computer rose to 22.3 percent while that of households provided with a facsimile grew to 20.7 percent. The same survey found 24.9 percent of households in possession of a cellular phone. The ratio of PHS ownership was 7.8 percent. The research found a personal computer at 62.2 percent of business workers. The ratio of personal computer user rose to 93.2 percent when offices hiring less than 100 employees were excluded from the count. The annual survey also found that the ratios of business offices using cellular phones and PHS grew 14.7 percent and 9.1 percent, respectively. The cellular telephone ownership ratio was 55.7 percent while 10.7 percent of surveyed business offices said they have PHS. In the meantime, the ratio of business office workers who use pagers decreased slightly.

3. Information and Communications Industry in 1996

In 1996, the Japanese information and communications market grew by 14 percent to ¥36,628,653 million. Information service, electronic manufacturing and telecommunications business accounted for ¥7,143,543 million, ¥17,349,810 million and ¥12,135,300 million of this total, respectively (refer to Table I-1).

Table I-1 Changes in the Information and Communications Market

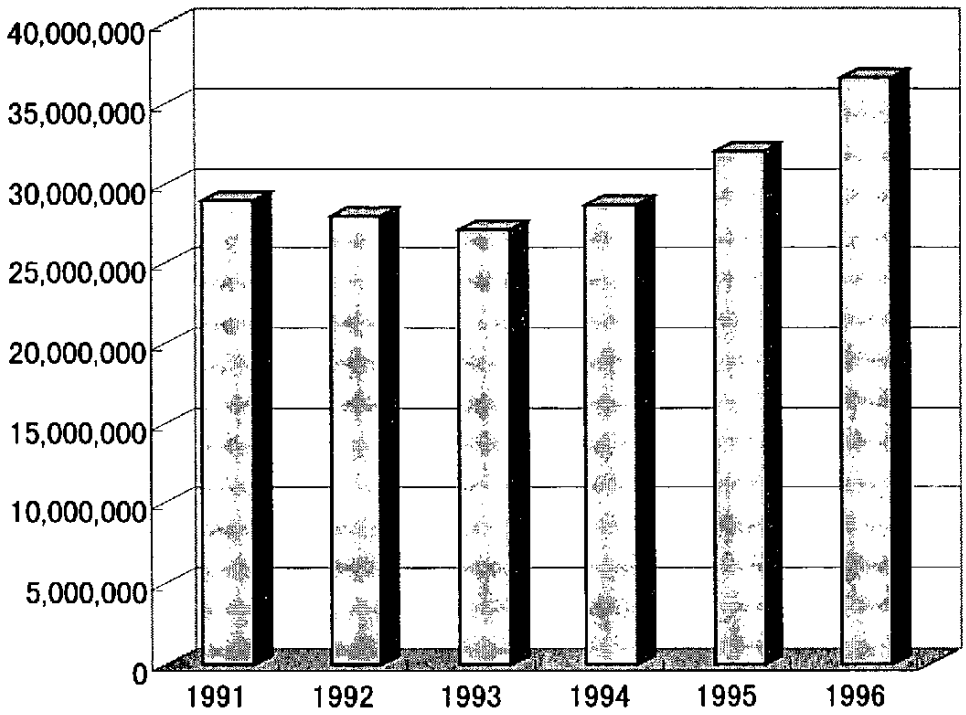
Unit: Million Yen

Year	Information Service	Electronic Manufacturing	Telecommunications Business	Total
1991	7,039,659	14,870,513	7,020,400	28,930,572
1992	7,127,618	13,473,503	7,351,400	27,952,521
1993	6,514,358	12,899,444	7747400	27,161,202
1994	6,177,007	14,001,467	8,508,500	28,686,974
1995	6,362,183	15,665,276	10,028,900	32,056,359
1996	7,143,543	17,349,810	12,135,300	36,628,653

As Figure I-1 informs, the Japanese information and communications market began to shrink in size following the burst of bubble economy in 1991. However, the market began to expand again in 1994 after hitting the bottom in 1993.

Figure I-1 Total Revenues of Information & Communications Industry

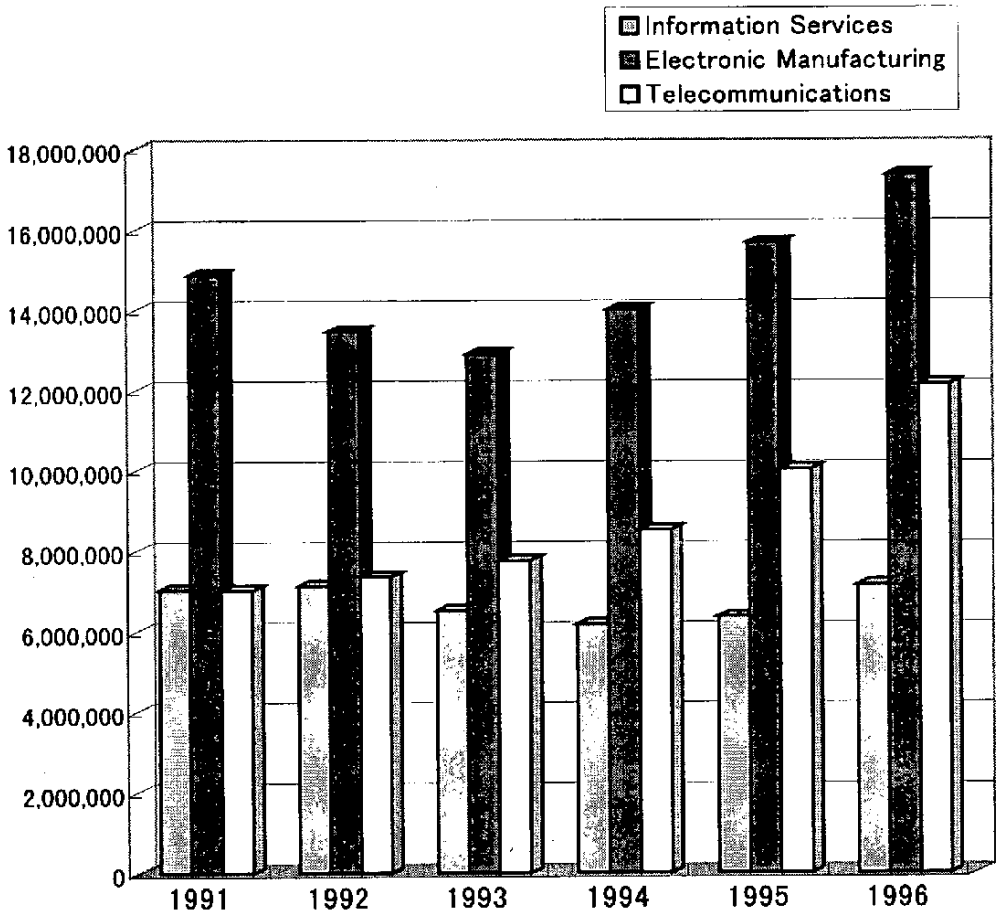
Unit: Million Yen



Electronic manufacturing is growing at a rapid pace, but telecommunications are the fastest growing market at present (see Figure I-2).

Figure I-2 Revenues by industry

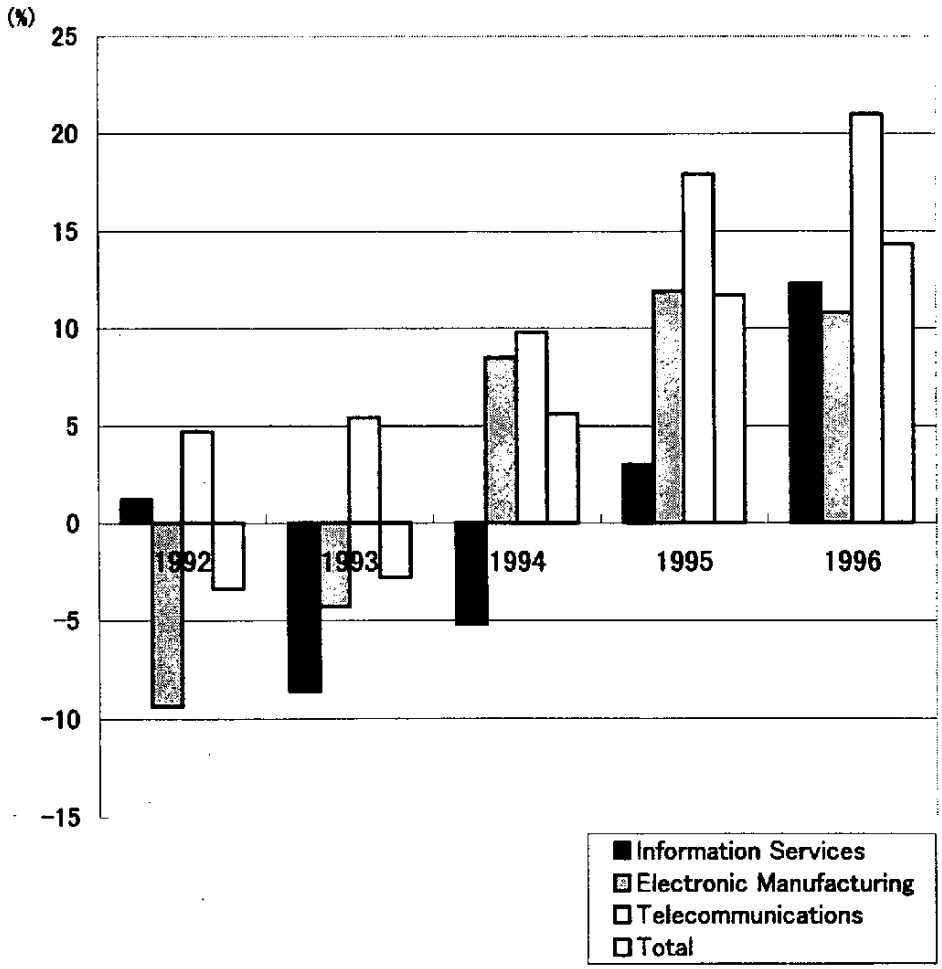
Unit: Million Yen



Ratios of year-to-year increase from 1992 to 1996 show that the burst of the economic bubble did not affect the telecommunications business. The telecommunications business achieved high year-to-year growth ratios of about 20 percent in 1995 and 1996 (refer to Figure I-3).

Figure I-3 Growth Rate of Information & Communications Industry

Unit: Million Yen

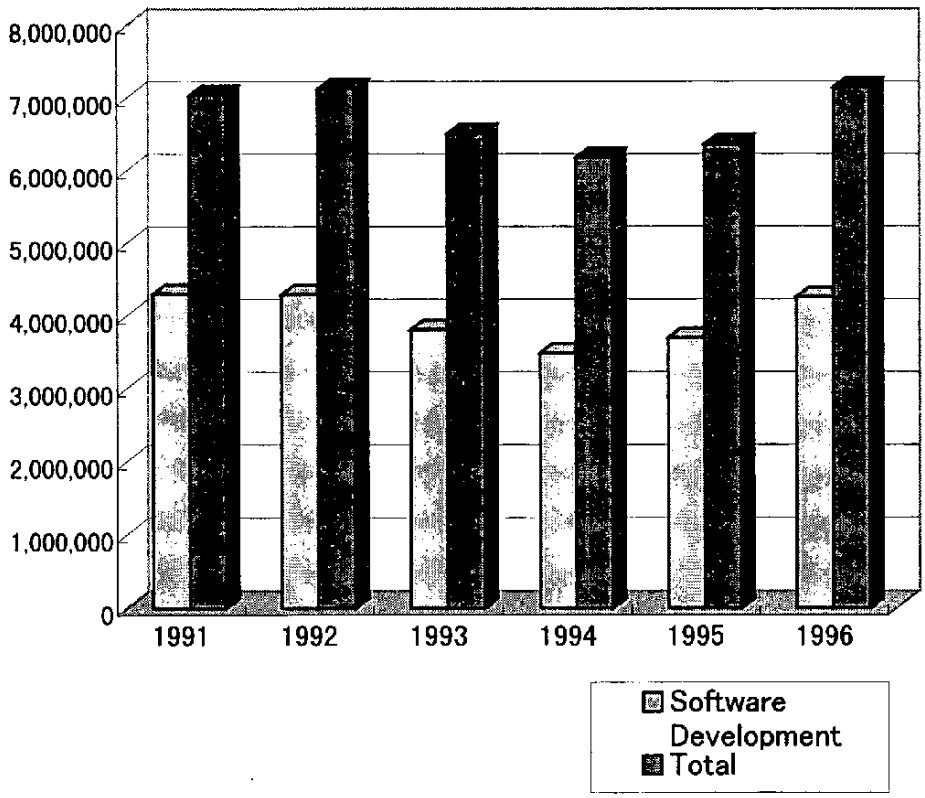


(1) Information Service

The information service sector hit the bottom in 1994, one year after other sectors did. Thanks to recovery of corporate invesment in information-related fields, the Japanese market for information service grew by 12 percent to ¥7,143.543 million in 1996. It means the market regained to the size it had in 1992. By category, software development accounts for more than half the sales of infomation service providers. Changes in software development trends are now directly affecting the industry (see Figure I-4).

Figure I-4 Total Revenue of Information Services Industry

Unit: Million Yen



(2) Electronic Manufacturing

The ratio of manufactured elctronics sales to entire information and communication sales has been falling. Still, electronic manufacturing accounts for about half the Japanese information and communications market. Business recovery in this sector is supporting the information and communications industry at present (see Figures I-5 and I-6).

Figure I-5 Revenue by Industry in 1991

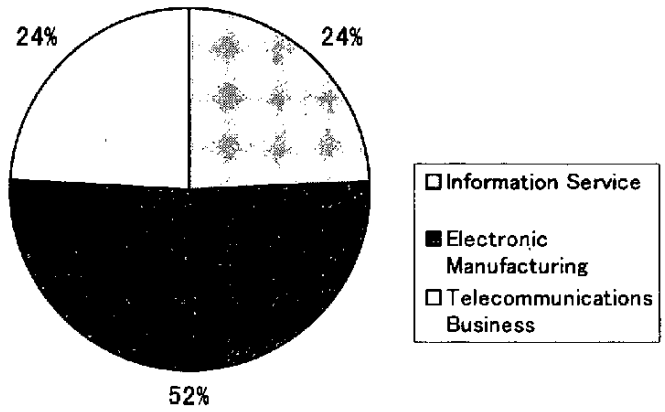
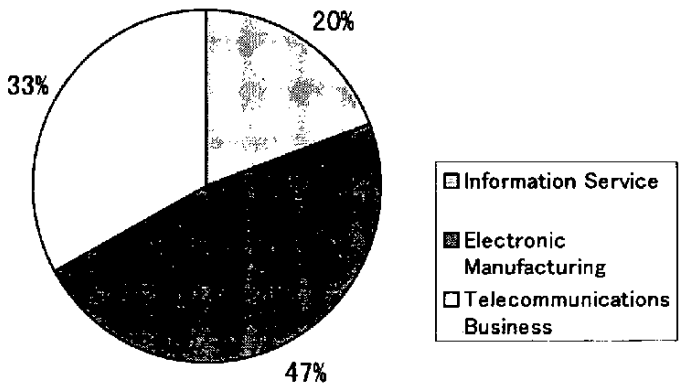


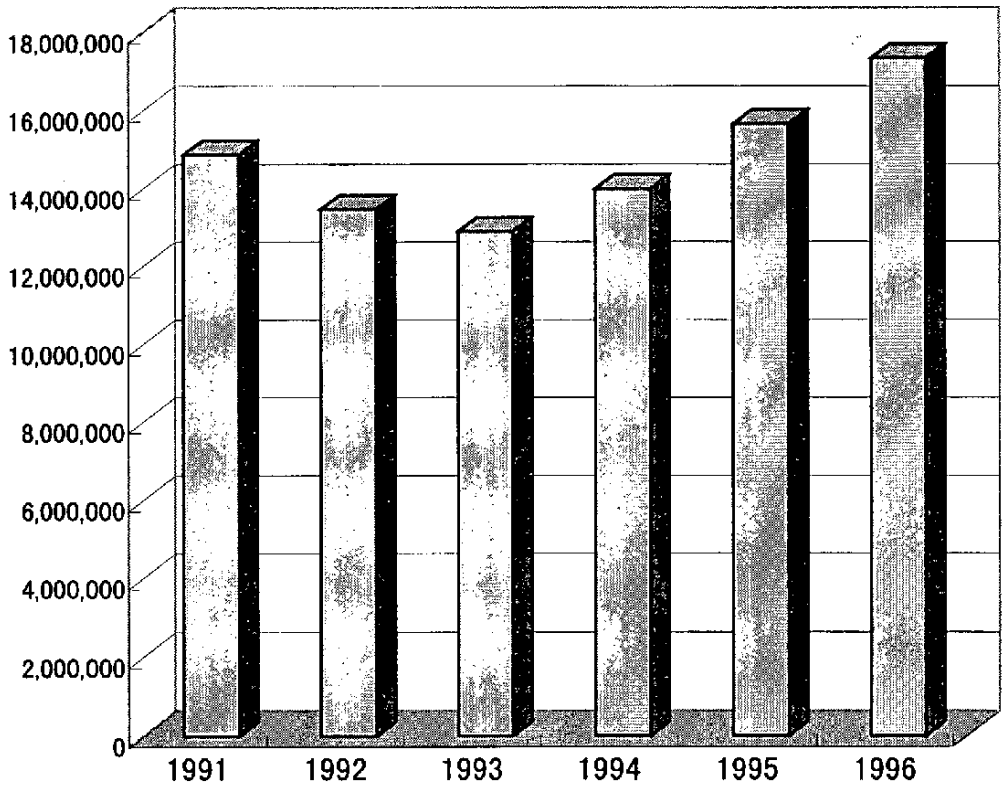
Figure I-6 Revenues by Industry in 1996



The market for manufactured electronics began to expand at the annual rate of about 10 percent in 1994 (refer to Figure I-3). In 1996, the market grew by 12 percent to ¥17,349,810 million. This business recovery owed to active investment in electronic manufacturing fields related to the Internet and mobile telephones (refer to Figure I-7).

Figure I-7 Total Revenue of Electronic Manufacturing

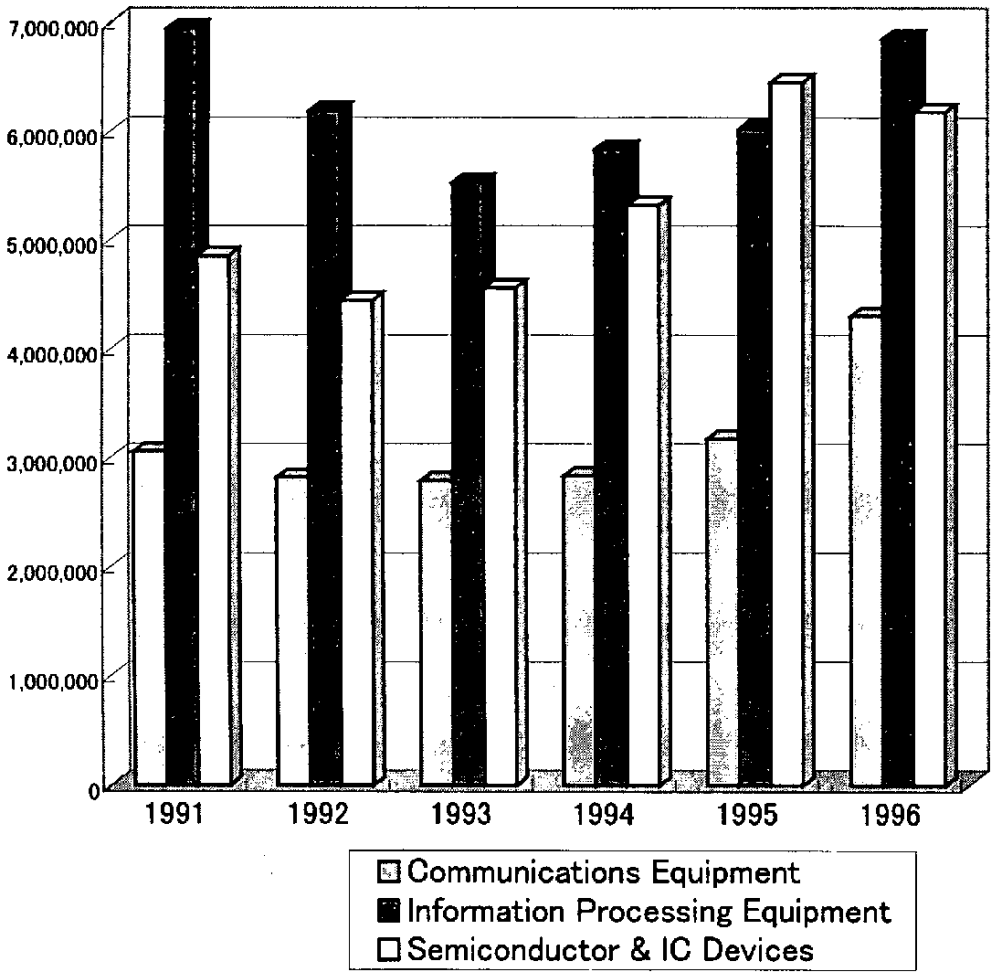
Unit: Million Yen



Meanwhile, production of semiconductors and integrated circuits (ICs) have been falling in value. This situation is a cause of our slight concern (see Figure I-8).

Figure I-8 Revenues of Electronic Manufacturing by Equipment

Unit: Million Yen

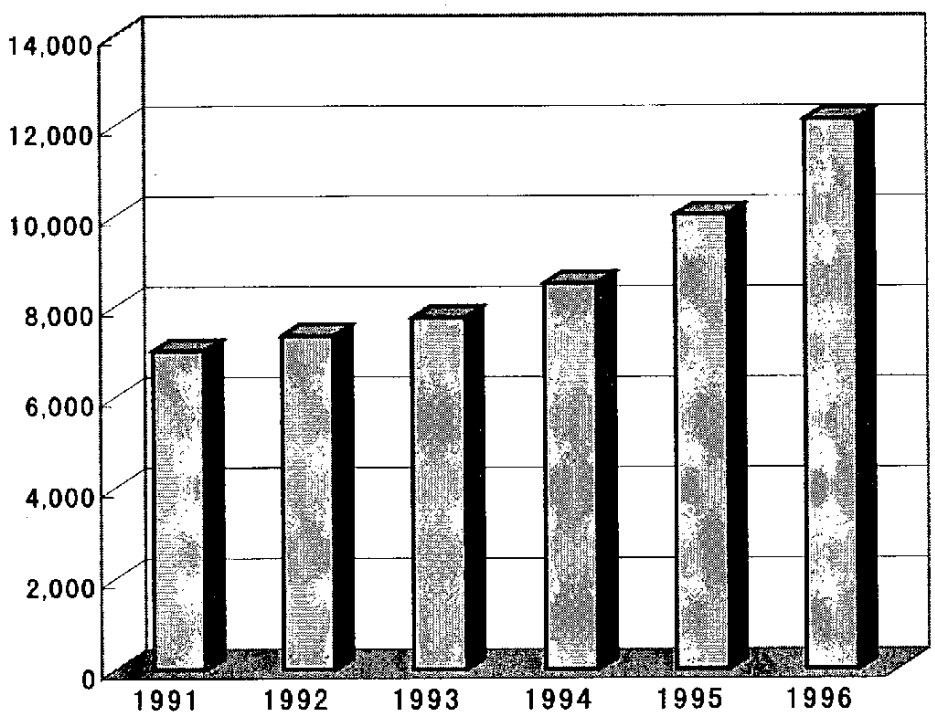


(3) Telecommunications Business

The telecommunications business continued to grow at a steady pace while other industries suffered losses. Figure I-3 portrays this. The telecommunications business achieved sales of ¥12,135,300 million in 1996. The figure represented an year-to-year increase of 21 percent (see Figure I-9).

Figure I-9 Total Revenue of Telecommunications Carriers

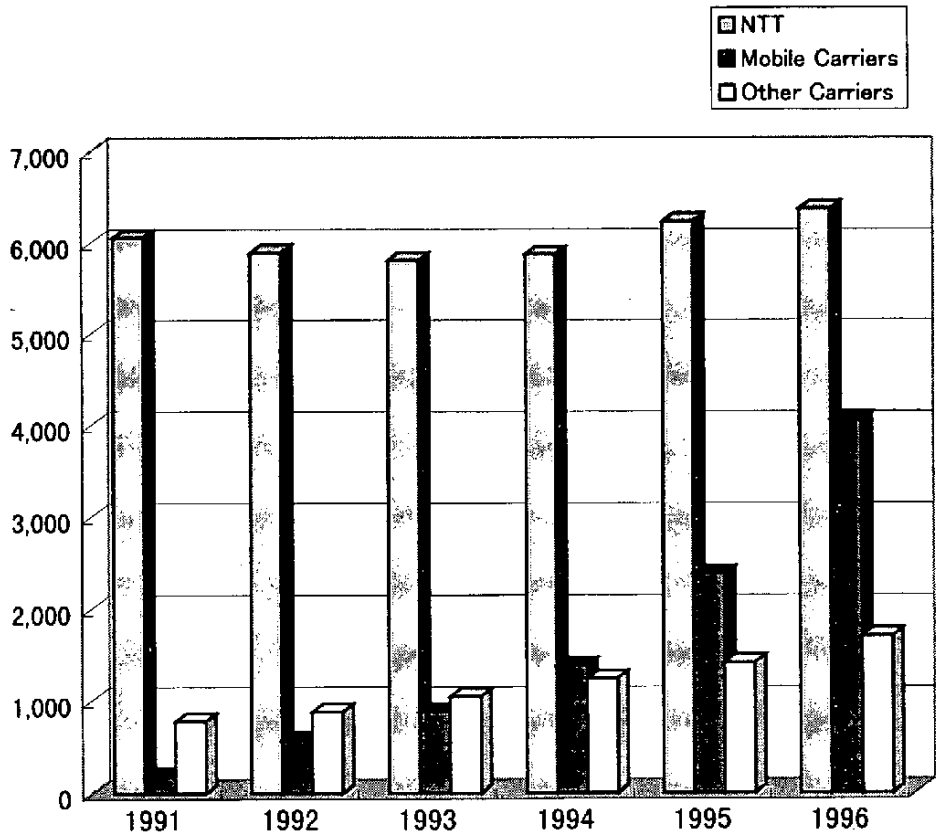
Unit: Billion Yen



Nippon Telegraph and Telephone Corporation (NTT) sold more than half of this amount, but NTT's ratio to total sales is falling year after year. Expansion of the market can be attested to by the fact that the combined sales of other companies have come to rival the amount sold by NTT. Mobile telephones companies are undergoing particularly remarkable business expansion (refer to Figure I-10).

Figure I-10 Revenue of NTT & Other Carriers

Unit: Billion Yen



II. Information Service

Data on information service we present in this paper come from the "Survey on Selected Service Industries -- Information Service Industry" prepared by the Ministry of International Trade and Industry (MITI). Data are as of November in each year. In the MITI survey, various types of information service are classified into the following categories.

(1) On-line data processing
- VAN (value-added network)
- Commissioned calculation

(2) Off-line data processing (commissioned calculation by way of batch processing)

(3) Software development
- Ordered software
- Software products

(4) Data entry

(5) Machine time sales

(6) Commissioned System Management and Administration

(7) Database service
- On-line service
- Off-line service

(8) Various surveys
- Marketing research
- Other surveys

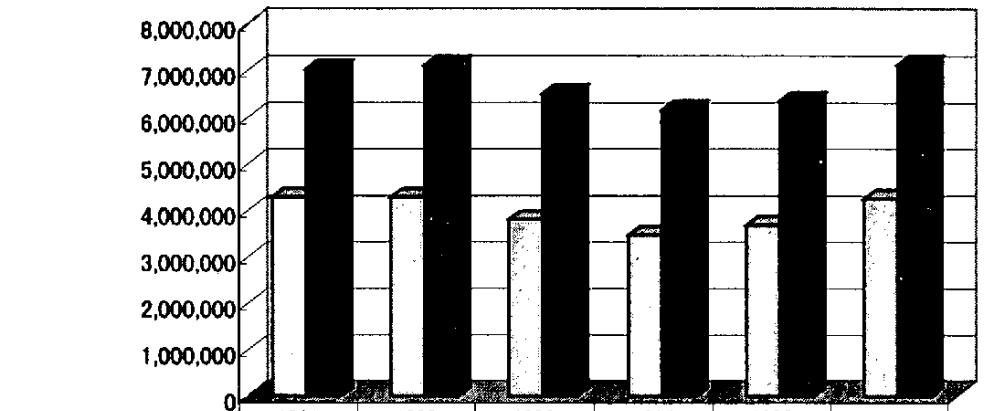
(9) Other service (including profits made by dispatches of registered specialists)

Software development accounts for more than half the entire information service sales. Changes in software development trends are directly affecting the information service industry now (see Figure II-1). The information service industry hit the bottom in 1994, one year after other industries did. Thanks to the recovery of corporate investment in information-related fields, the Japanese market for information service grew by 12 percent to ¥7,143,543 million in 1996. It means the market regained the size it had in 1992. However, the number of employees who

engage in information service recovered only slightly (refer to Figure II-2). The decreasing number of programmers is a primary cause of this situation.

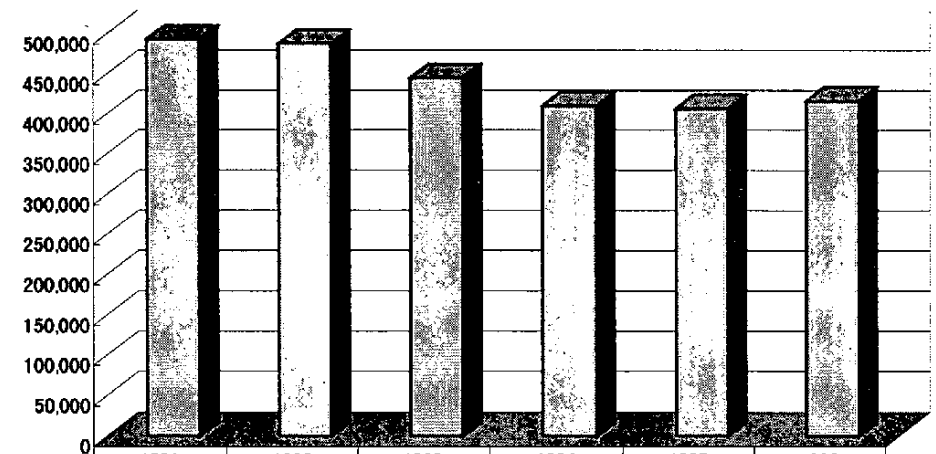
Figure II-1 Revenues of Information Services Industry

Unit: Million Yen



	1991	1992	1993	1994	1995	1996
Software Development	4,301,045	4,295,891	3,813,287	3,485,844	3,697,132	4,258,186
Total	7,039,659	7,127,618	6,514,358	6,177,007	6,362,183	7,143,543

Figure II-2 Number of Personnel of Information Services Industry



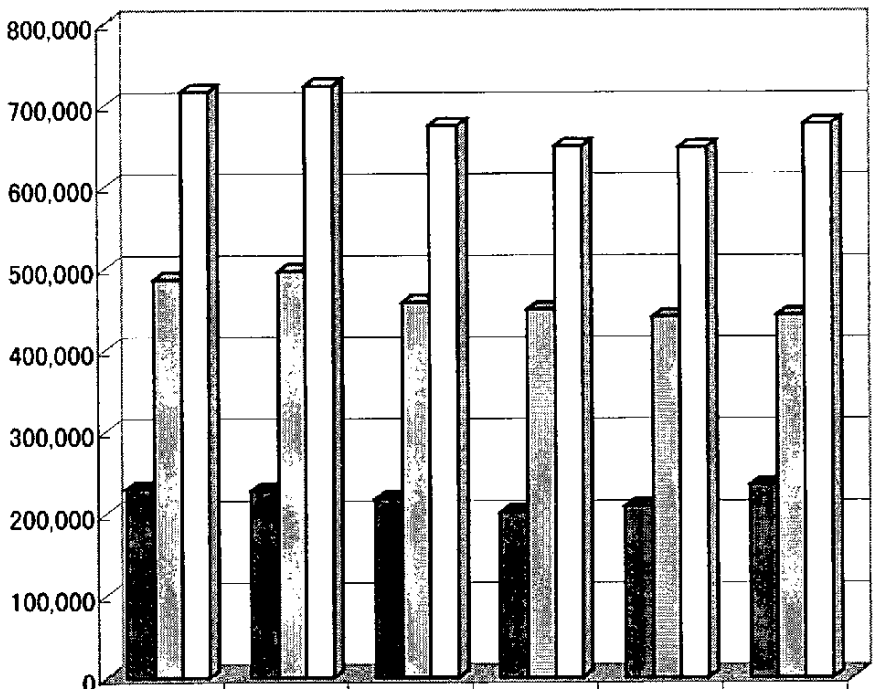
	1991	1992	1993	1994	1995	1996
Personnel	493,278	488,469	445,662	410,960	407,396	417,087

1. On-Line Data Processing

On-line data processing achieved the sales of ¥676,094 million in 1996. The figure represented an increase of 4.4 percent over the previous year's record. VAN and commissioned on-line calculation respectively accounted for ¥234,207 million and ¥441,887 million of this total. VAN recorded an year-to-year sales growth of 12.7 percent while commissioned on-line calculation sold 0.5 percent more than it did in 1995 (refer to Figure II-3).

Figure II-3 Revenue of On-line Data Processing

Unit: Million Yen



	1991	1992	1993	1994	1995	1996
VAN	230,036	227,563	217,204	200,424	207,823	234,207
RCS	485,664	495,800	457,675	448,690	439,481	441,887
Total	715,700	723,363	674,878	649,114	647,303	676,094

2. Off-Line Data Processing

Sales from off-line data processing fell sharply in 1994 but then made a strong comeback. The development represents the corporate attempt to re-examine the effect of information investment under severe economic circumstances. We can assume Japanese companies came to re-evaluate off-line data processing as part of outsourcing effort. Off-line data processing achieved the sales of ¥376,052 million in 1996. The sales figure representated an year-to-year increase of 14.3 percent. The amount also suggested that the market returned to the size of 1992 (refer to Figure II-4).

Figure II-4 Revenue of Offline Processing

Unit: Million Yen

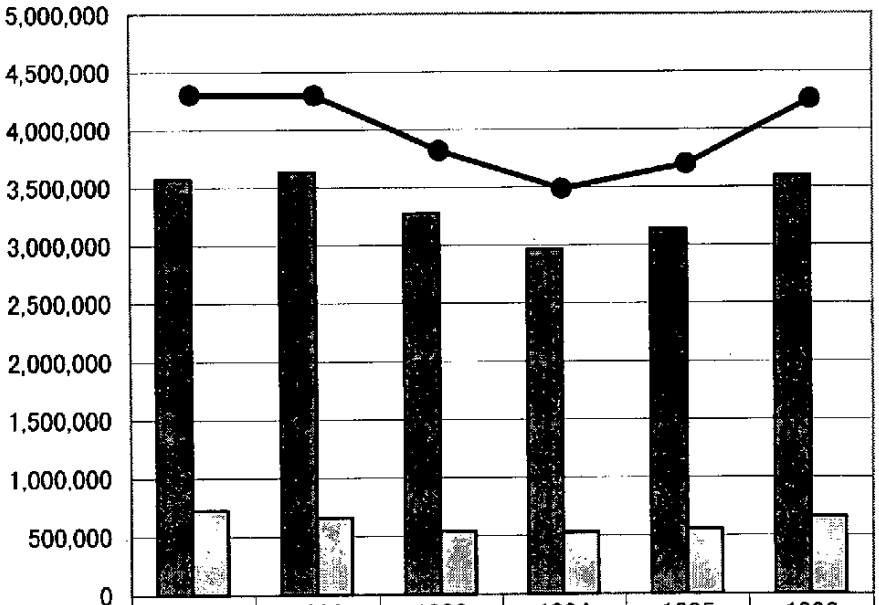
	1991	1992	1993	1994	1995	1996
Offline Processing	379,100	376,765	333,370	316,878	329,121	376,052

3. Software Development

Software development accomplished an year-to-year sales growth of 6.1 percent in 1995. In 1996, sales from software development increased further by 15.2 percent and totaled ¥4,258,186 million. It means that the market returned to the size it had in 1992 (refer to Figure II-5). As Figure II-6 shows, ordered software accounted for ¥3,587,064 million or 84.5 percent of the total sales. Software products sold the remaining ¥661,122 million.

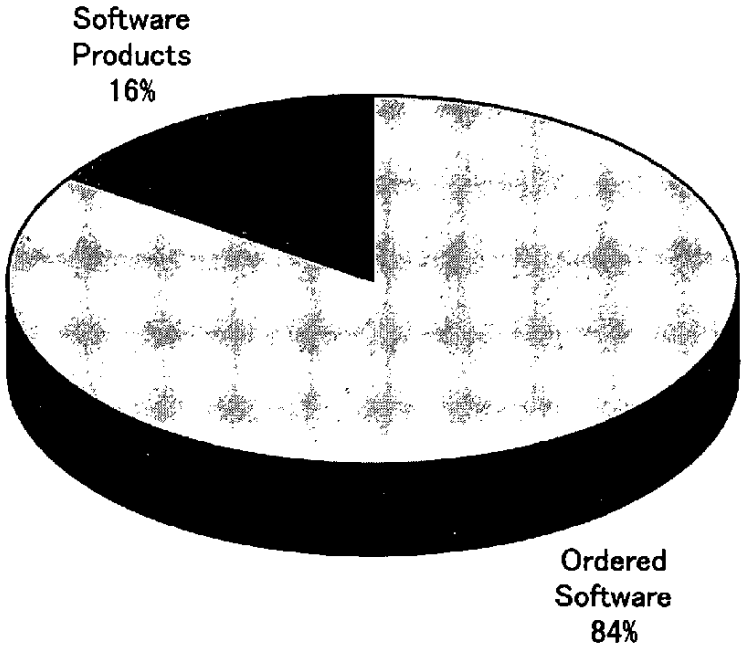
Figure II-5 Revenue of Software Development

Unit: Million Yen



	1991	1992	1993	1994	1995	1996
Ordered Software	3,575,139	3,635,440	3,274,518	2,961,195	3,140,457	3,597,064
Software Products	725,905	660,452	538,770	524,649	556,675	661,122
Total	4,301,045	4,295,891	3,813,287	3,485,844	3,697,132	4,258,186

Figure II-6 Ordered Software and Software Products

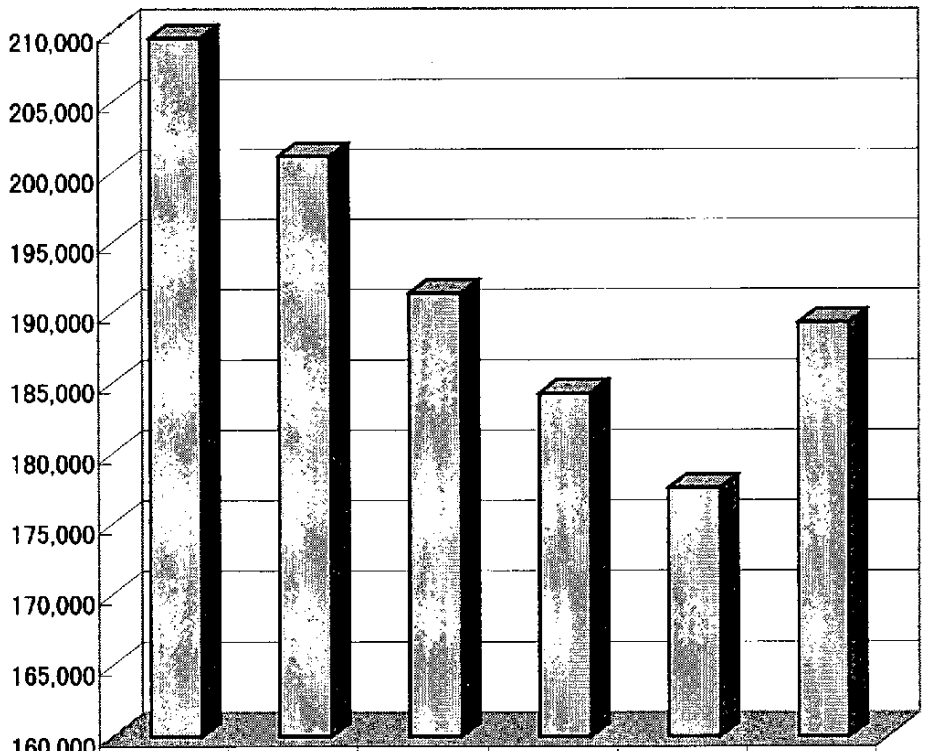


4. Data entry

In 1996, data input using keyboards achieved the sales of ¥189,280 million. The figure represented an year-to-year sales growth of 6.6 percent (see Figure II-7). This figure seems unlikely in consideration of the widespread use of information machines and equipment featuring keyboards. It looks like another manifestation of the corporate outsourcing attempt.

Figure II-7 Revenue of Data Entry

Unit: Million Yen



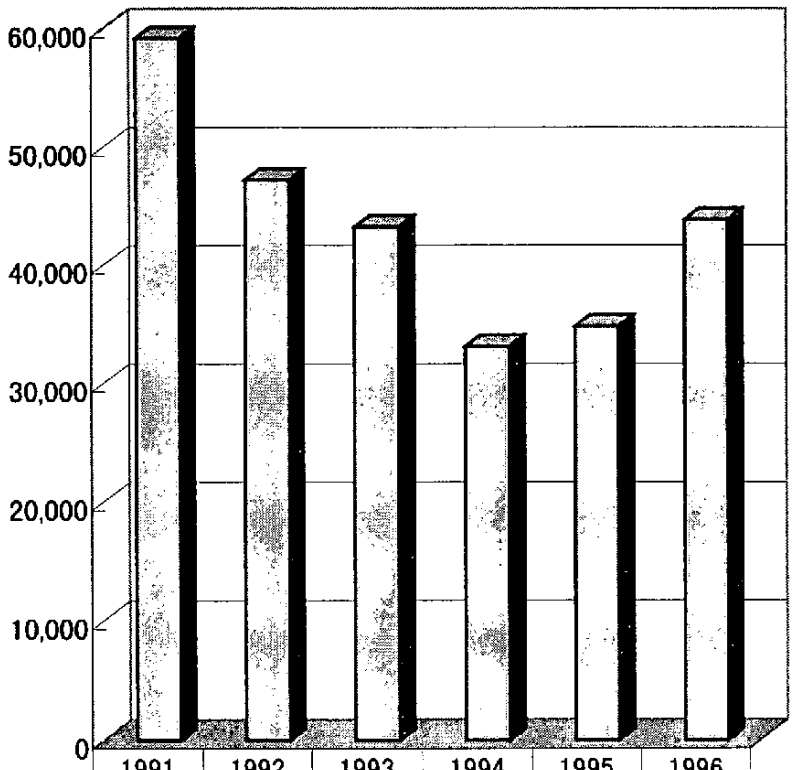
	1991	1992	1993	1994	1995	1996
Data Entry	209,607	201,178	191,396	184,276	177,529	189,280

5. Machine Time Sales

Machine time sales totaled ¥43,864 million in 1996. The amount represented an year-to-year increase of 26 percent. In 1996, machine time sales returned to the level of 1993 (see Figure II-8) .

Figure II-8 Revenue of Machine Time Sales

Unit: Million Yen



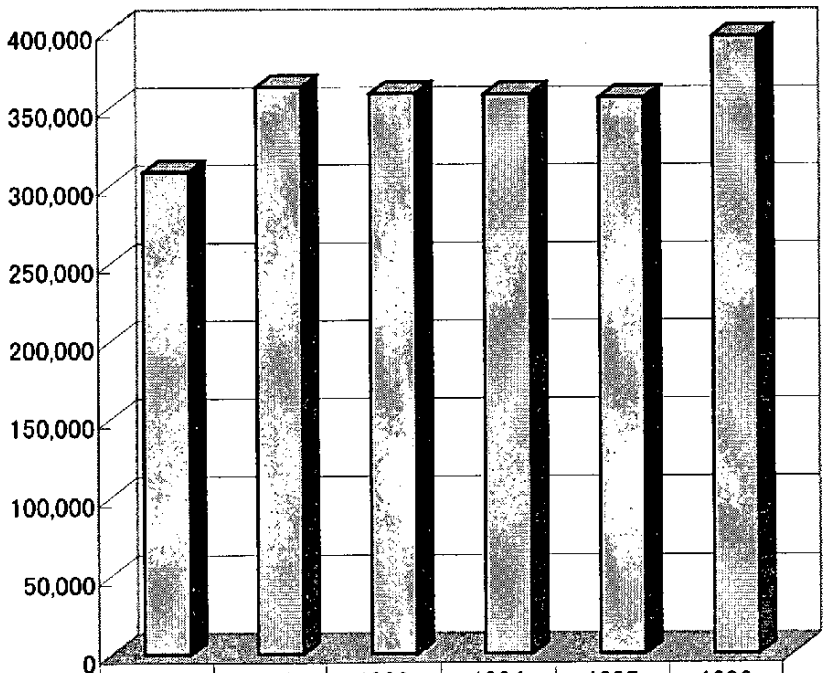
	1991	1992	1993	1994	1995	1996
Machine Time Sales	59,217	47,212	43,251	33,152	34,807	43,864

6. Commissioned System Management and Administration

In 1996, commissioned system management and administration registered the sales of ¥395,730 million. The figure represented an year-to-year sales increase of 11.1 percent. Again, this figure is a manifestation of the increasing outsourcing demand among companies trying to cut expenses. (see Figure II-9)

Figure II-9 Revenue of Commissioned System Management and Administration

Unit: Million Yen



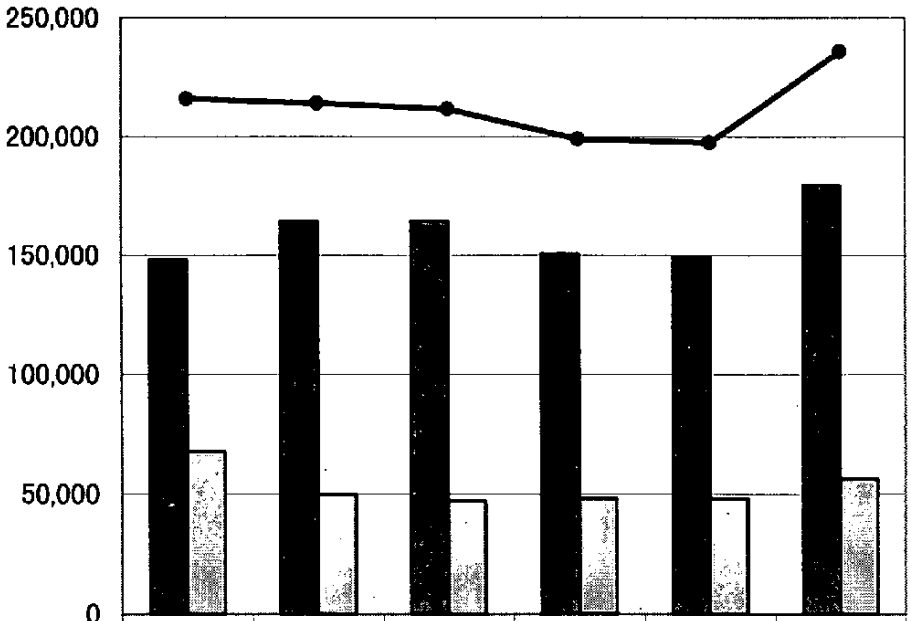
	1991	1992	1993	1994	1995	1996
Systems Management	308,837	363,394	359,084	358,524	356,335	395,730

7. Database

Database service achieved the sales of ¥235,744 million in 1996. The figure represented an year-to-year sales increase of 19.5 percent (see Figure II-10). On-line databases and their off-line counterparts accounted for ¥179,244 million and ¥56,000 million of this total, respectively. On-line databases achieved an year-to-year sales growth of 20.1 percent while off-line databases boosted their sales by 17.5 percent. On-line databases account for about three quarters of the market now (refer to Figure II-11).

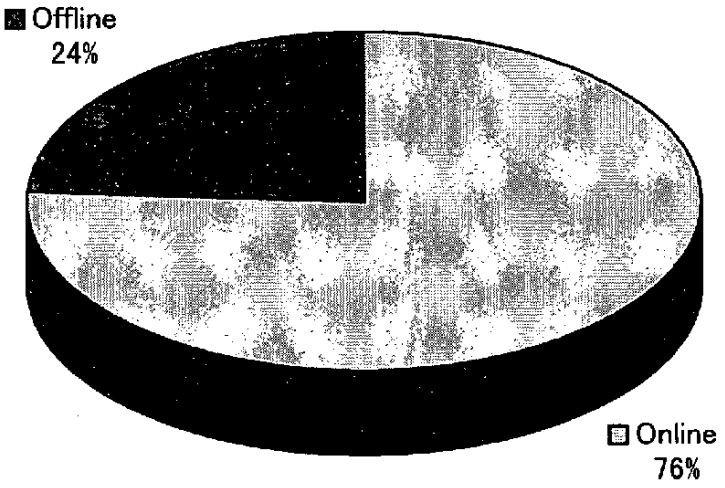
Figure II-10 Revenue of Database Service

Unit: Million Yen



	1991	1992	1993	1994	1995	1996
Online	148,135	164,199	164,370	150,671	149,190	179,244
Offline	67,845	49,865	47,138	48,168	48,101	56,500
Total	215,981	214,064	211,508	198,839	197,291	235,744

Figure II-11 Online Database and Offline Database

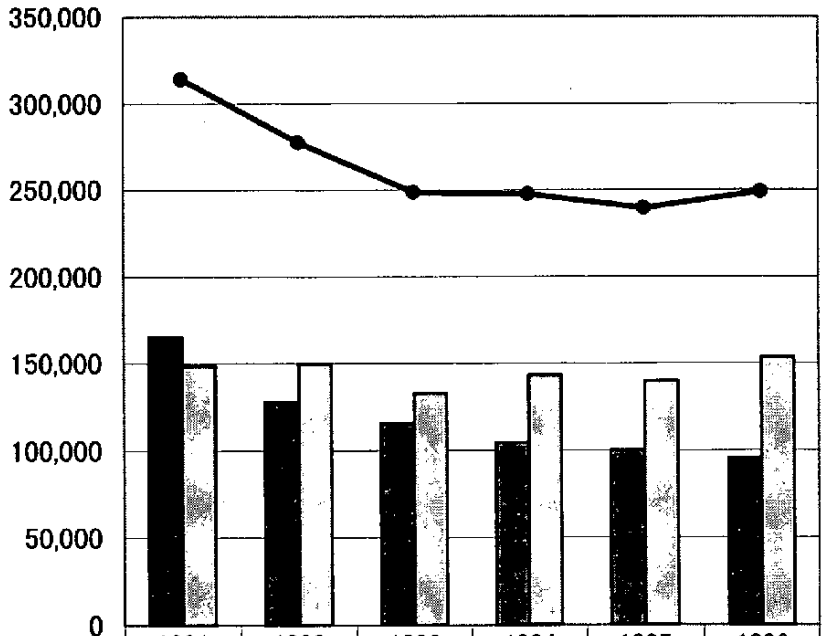


8. Various Surveys

In 1996, various surveys registered the sales of ¥249,049 million. The figure increased by about 4 percent from the previous year. Marketing research and other surveys accounted for 95,518 million and ¥153,531 million of this total, respectively. Marketing research sold 4.4 percent less than it did the year before. Meanwhile, other surveys registered an year-to-year sales increase of about 10 percent. Sales from surveys have stayed at about the same level since 1993. However, sales from marketing research have been dropping in a consistent manner (refer to Figure II-12).

Figure II-12 Revenue of Various Surveys

Unit: Million Yen



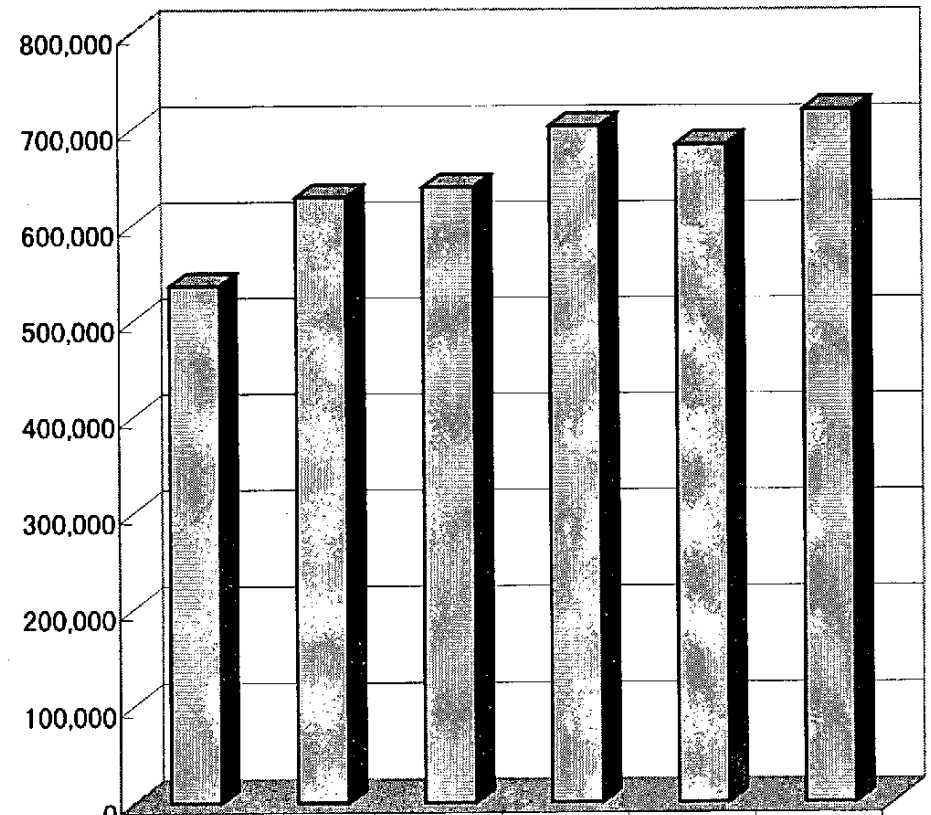
	1991	1992	1993	1994	1995	1996
Market Research	165,070	127,678	115,618	104,279	99,928	95,518
Other Research	148,661	149,560	132,802	143,277	139,599	153,531
Total	313,731	277,238	248,421	247,556	239,527	249,049

9. Other Service (Including Profits Made by Dispatches of Registered Specialists)

Other service achieved the sales of ¥719,544 million in 1996. The figure represented an year-to-year sales increase of 5.3 percent.

Figure II-13 Revenue of Others

Unit: Million Yen



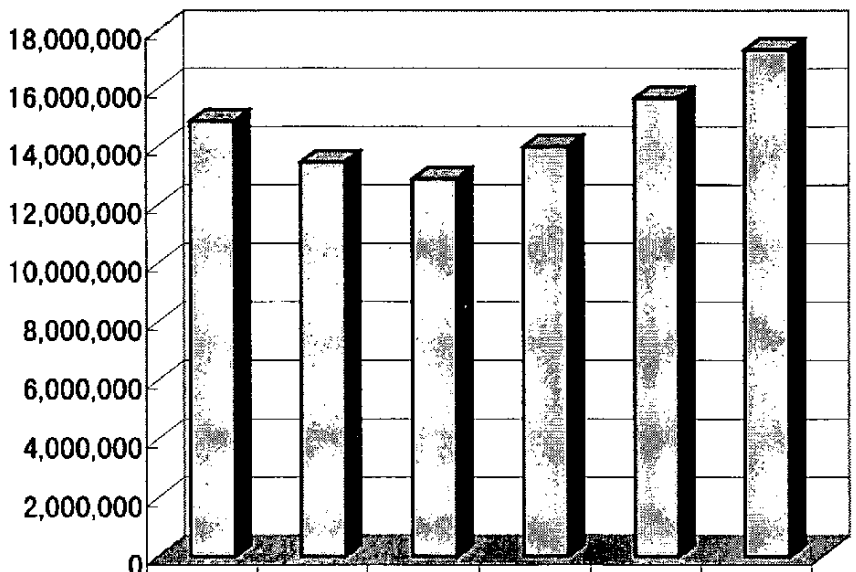
	1991	1992	1993	1994	1995	1996
Others	536,443	628,511	639,162	702,826	683,138	719,544

III. Electronic Manufacturing

In this paper, We are quoting data on the state of electronic manufacturing from the Industry Statistics compiled by the Ministry of International Trade and Industry (MITI). The following figures are values of shipments for three categories combined – "communications machines and equipment and applied radio apparatuses," "applied electronic apparatuses" and "electron tubes, semiconductors and integrated circuits." The figures appearing in the Industry Statistics are updated every year at the end of December.

Figure III-1 Revenue of Electronic Manufacturing

Unit: Million Yen

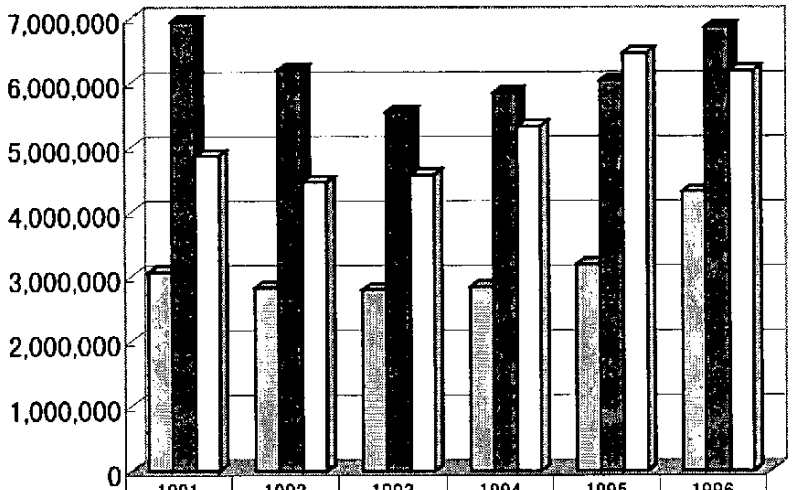


	1991	1992	1993	1994	1995	1996
Electronic Equipments	14,870,51	13,473,50	12,899,44	14,001,46	15,665,27	17,349,81

The value of electronics manufactured and shipped in 1996 totaled ¥17,349,810 million. This figure represented an year-to-year shipment growth of 10.8 percent (see Figure III-1). Communications machines and equipment and applied radio apparatuses registered shipment of ¥4,307,037 million. The figure represented an increase of 35.4 percent from 1995. Applied electronic apparatuses manufactured and shipped in 1996 totaled ¥6,858,746 million or 13.8 percent more than they did one year earlier. Meanwhile, electron tubes, semiconductors and integrated circuits saw the value of their shipments drop by 4.2 percent to ¥6,184,027 million in 1996. Communications machines and equipment and applied radio apparatuses showed conspicuous shipment increase in 1996 (see Figure III-2).

Figure III-2 Revenue by Electronic Equipment

Unit: Million Yen

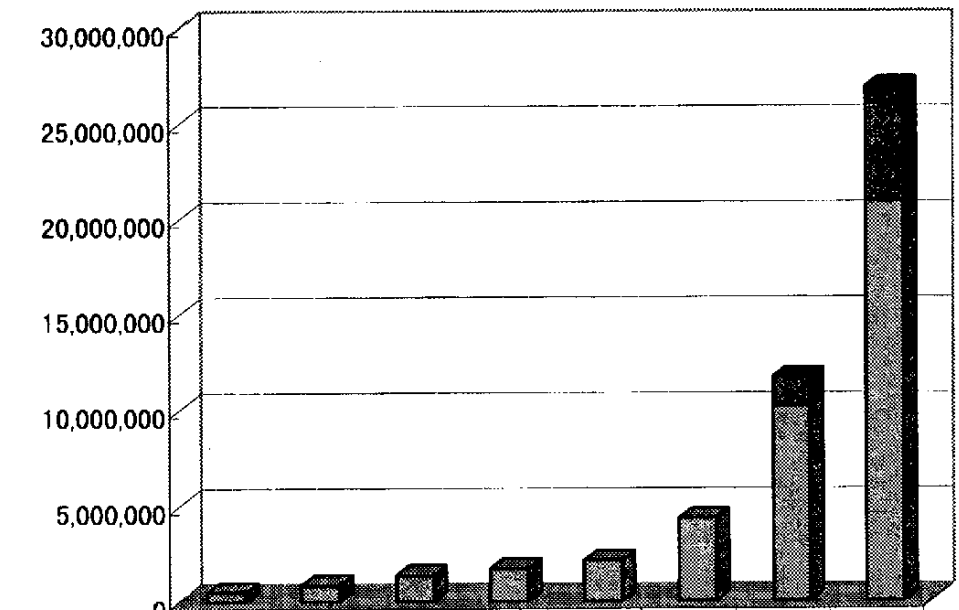


	1991	1992	1993	1994	1995	1996
Communications Equipment	3,063,641	2,822,958	2,792,525	2,838,042	3,180,744	4,307,037
Information Processing Equipment	6,946,362	6,195,428	5,541,972	5,841,875	6,028,309	6,858,746
Semiconductor & IC Devices	4,860,510	4,455,117	4,564,947	5,321,550	6,456,223	6,184,027

1. Communications Machines and Equipment and Applied Radio Apparatuses

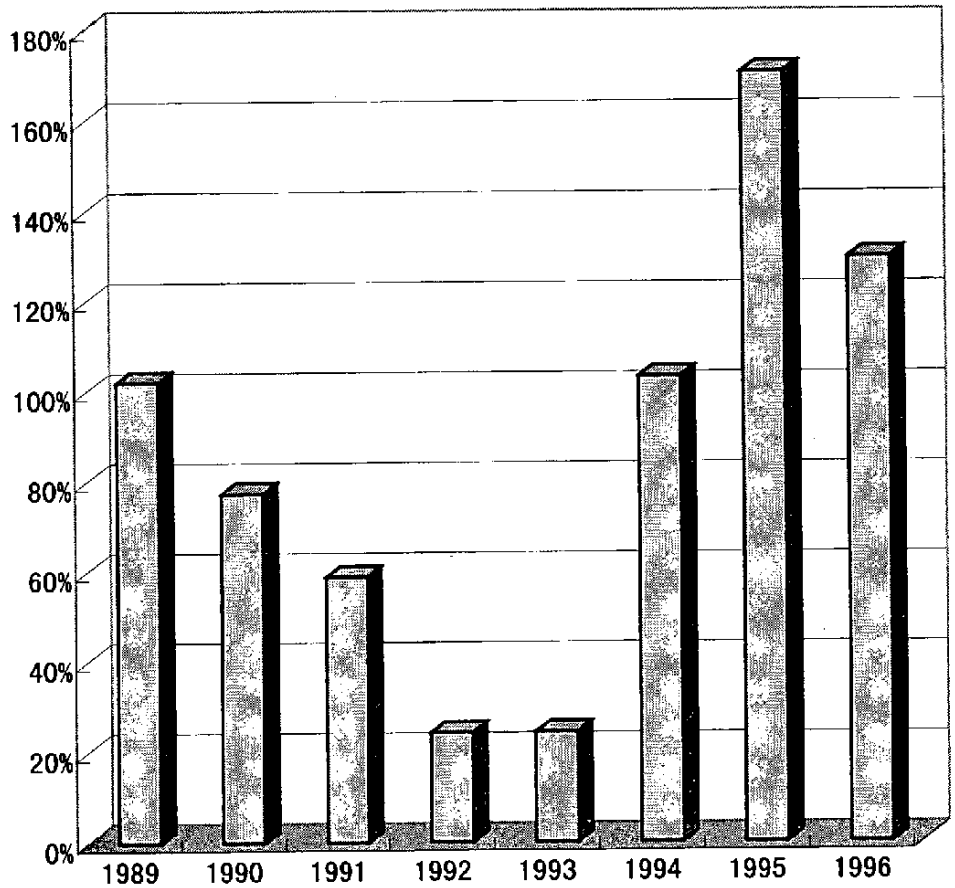
The biggest cause of rapid shipment growth in this product category starting in 1994 is liberalization of the cellular phone market in April 1994. The move animated the previously inactive mobile telephone terminals. Liberalization of mobile telephone terminals caused companies to lower call charges and diversify their service. Under the positive effects of these developments, the number of telephone subscribers grew at astonishing ratios in excess of 100 percent for three years in a row. The number of phone subscribers increased by 103.2 percent in 1994, 170.6 percent in 1995 and 129.5 percent in 1996 (refer to Figures III-3 and III-4).

Figure III-3 Number of Subscribers of Cellular Phone and PHS



	1989	1990	1991	1992	1993	1994	1995	1996
PHS							1,516,500	6,026,200
Cellular Phone	489,558	868,078	1,378,108	1,712,545	2,131,367	4,331,369	10,204,02	20,877,10

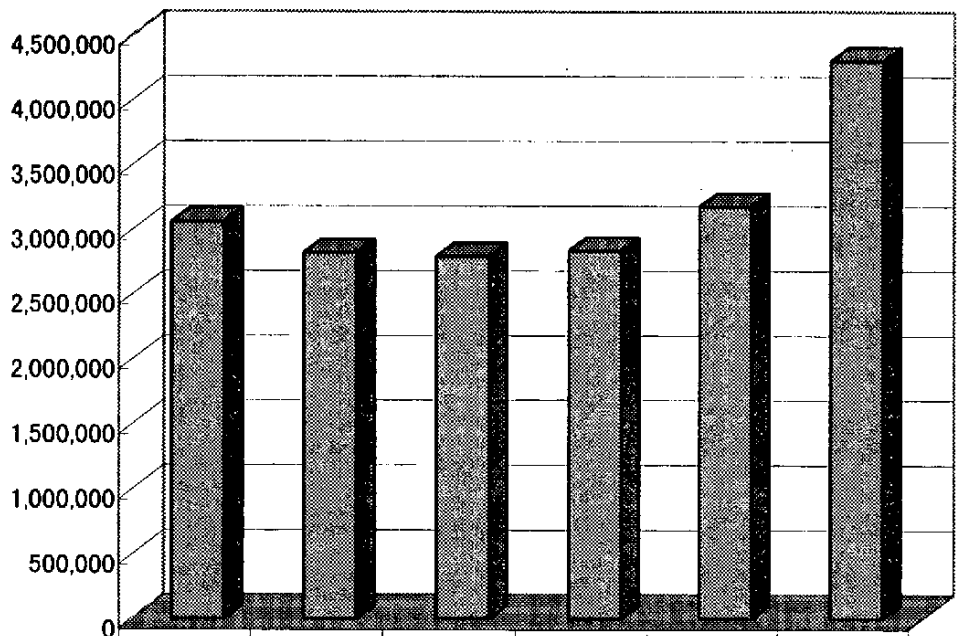
Figure III-4 Ratio of Year-to-Year Increase of Mobile Phone Subscribers



In 1996, communications machines and equipment and applied radio apparatuses worth ¥4,307,037 million were made and shipped (refer to Figure III-5). Telephones, facsimiles, switches, transmission machines and equipment and radio equipment respectively accounted for ¥300,111 million, ¥306,737 million, ¥787,404 million, ¥804,309 million and ¥2,018,476 million of this total. The value of telephone shipment fell by 5.9 percent. Fascimile shipment rose 0.9 percent in value. Switches increased the value of shipment by 31.6 percent. Transmission machines and equipment pushed up the value of shipment by 32,4 percent. Radio equipment achieved shipment increase of 56 percent. As these figures indicate, radio equipment boosted the value of shipment in a conspicuous manner in 1996 (refer to Figure III-6).

Figure III-5 Revenue of Communications Manufacturing

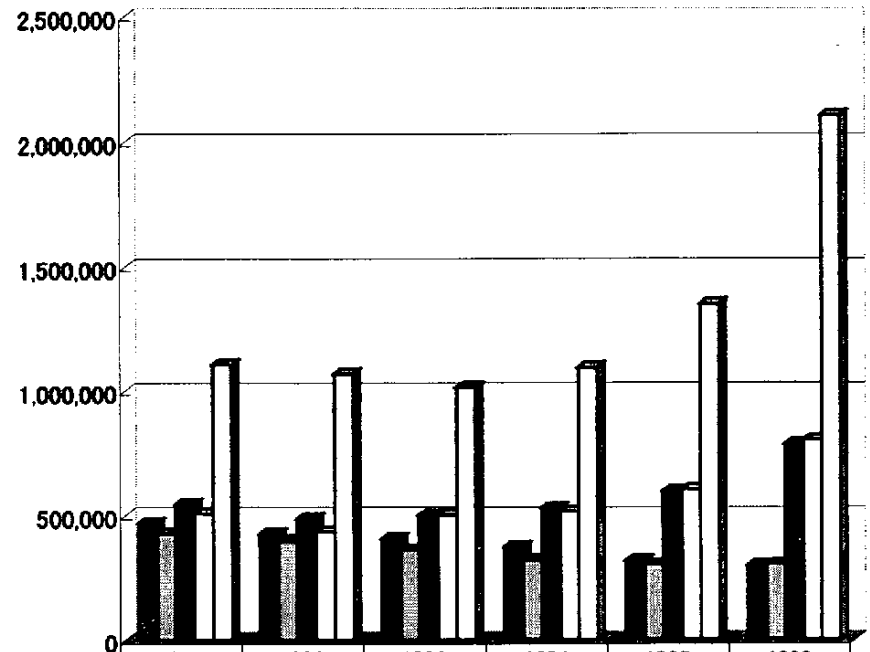
Unit: Million Yen



	1991	1992	1993	1994	1995	1996
Total	3,063,641	2,822,958	2,792,525	2,838,042	3,180,744	4,307,037

Figure III-6 Revenue by Communications Equipment

Unit: Million Yen



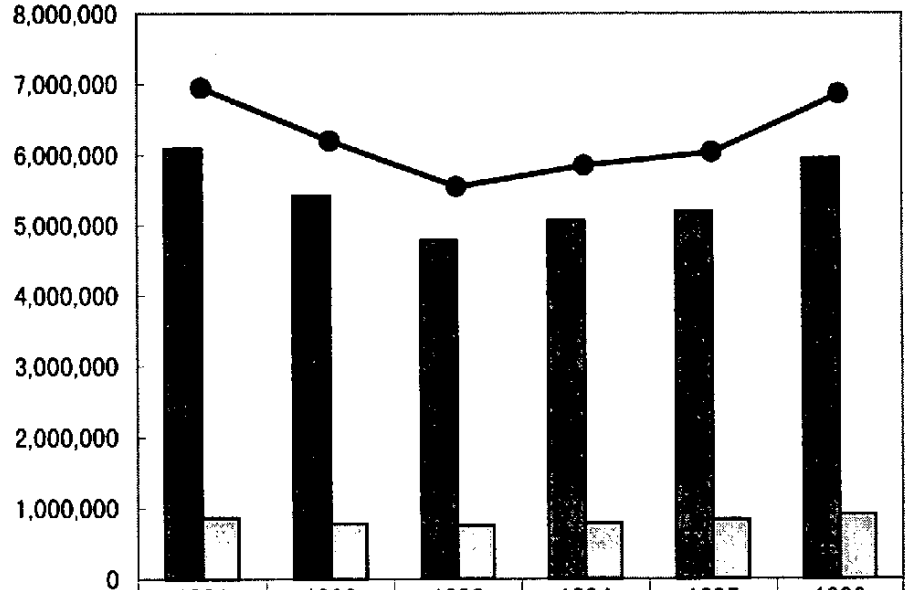
	1991	1992	1993	1994	1995	1996
Telephones	471,271	427,710	406,612	374,309	319,226	300,111
Facsimiles	428,534	399,149	362,737	319,694	304,008	306,737
Switches	547,994	489,649	503,201	530,731	598,420	787,404
Transmission	507,796	435,285	503,937	516,212	607,270	804,309
Wireless	1,108,046	1,071,165	1,016,038	1,097,096	1,351,820	2,108,476

2. Applied Electronic Apparatuses

Applied electronic apparatuses worth ¥6,858,746 million were manufactured and forwarded in 1996. Computers and related apparatuses and other applied electronic products accounted for ¥5,949,111 million and ¥909,635 million of this total, respectively. The value of shipped computers and related apparatuses achieved an year-to-year growth of 14.5 percent. Other products boosted the value of their shipment by 9.3 percent (see Figure III-7).

Figure III-7 Revenue of Applied Electronic Apparatuses

Unit: Million Yen

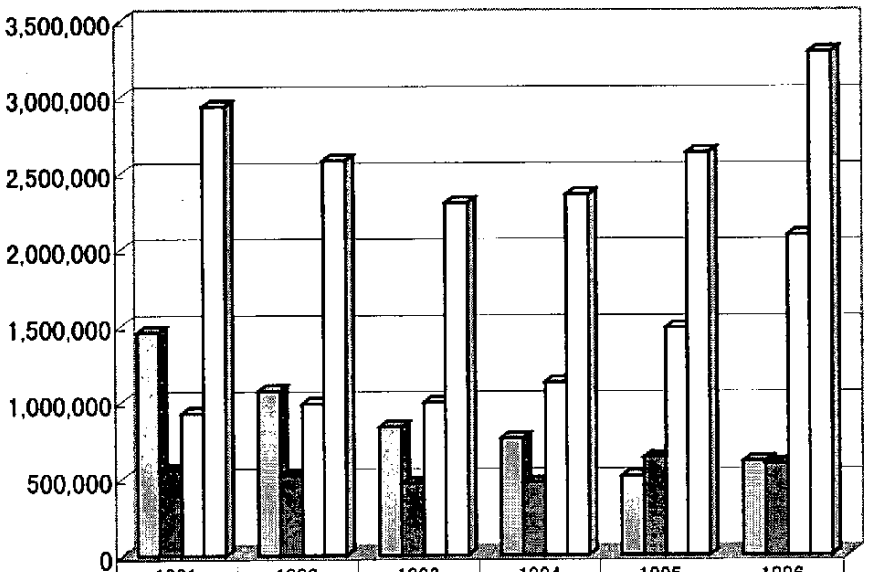


	1991	1992	1993	1994	1995	1996
Computers	6,083,430	5,416,738	4,790,394	5,064,055	5,195,884	5,949,111
Others	862,932	778,690	751,578	777,820	832,425	909,635
Total	6,946,362	6,195,428	5,541,972	5,841,875	6,028,309	6,858,746

The value of computers manufactured and shipped in 1996 totaled ¥3,293,085 million. This sum represented an increase of 25.2 percent from the previous year. Mainframe computers, personal computers and other types of computers accounted for ¥611,425 million, ¥2,087,569 million and ¥594,091 million of this total, respectively (refer to Figure III-8). The value of shipped mainframe computers achieved an year-to-year increase of 18.8 percent. Personal computers boosted the value of their shipment by 41 percent. The value of other types of computers manufactured and shipped in 1996 dropped by 6.6 percent. Comparison of the values of shipments in 1991 and 1996 makes it obvious that personal computers have won the dominant position in the computer industry (refer to Figures III-9 and III-10).

Figure III-8 Revenue of Computer Manufacturing

Unit: Million Yen



	1991	1992	1993	1994	1995	1996
Mainframe	1,456,767	1,070,994	835,554	760,121	514,525	611,425
Other Computers	557,358	519,785	468,419	471,516	635,738	594,091
Personal Computer	923,267	987,821	994,746	1,123,851	1,480,908	2,087,569
Total	2,937,392	2,578,600	2,298,719	2,355,488	2,631,171	3,293,085

Figure III-9 Shares of Value in 1991

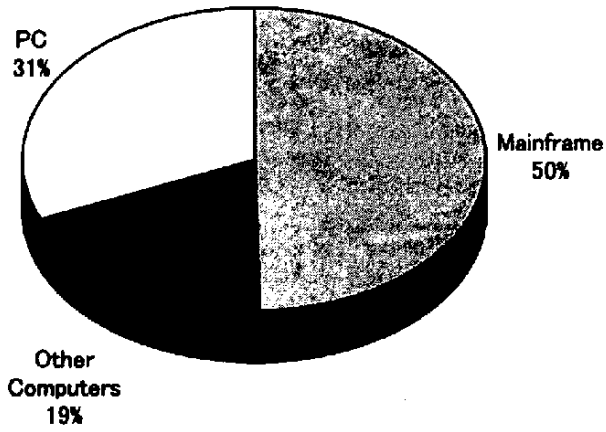
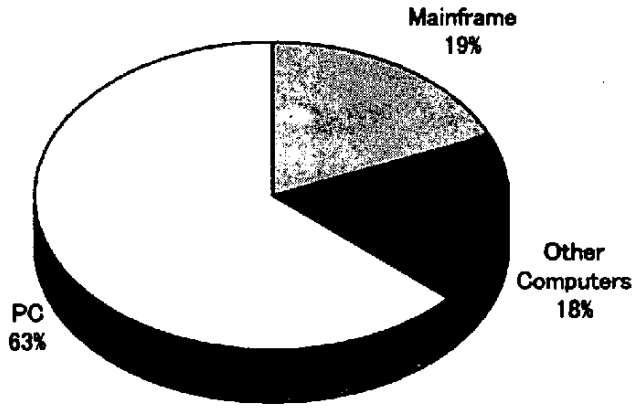
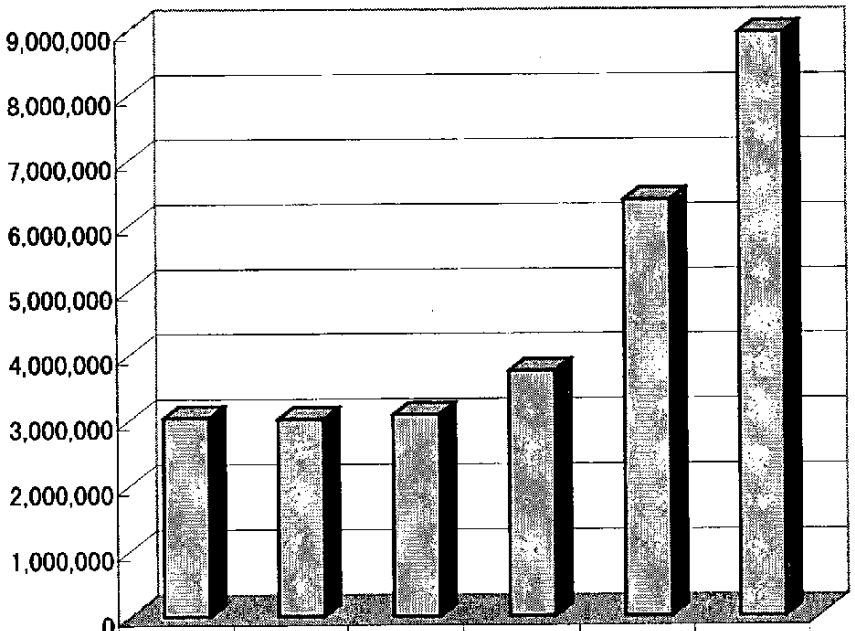


Figure III-10 Shares of Value in 1996



The number of shipped personal computers began to rise again in 1994 thanks to the growing use of the Internet that served as a following wind (see Figure III-11). Manufacturers evolved intense price competition in 1995 (refer to Figure III-12). Thanks to this price war, the number of shipped personal computers increased by 70.3 percent in that year. The upward trend is continuing. In 1996, the number of personal computers shipped by manufacturers grew by 40.5 percent. However, personal computer manufacturers reflected on the 1995 price war and withdrew from unreasonable price competition. As a result of this, personal computer prices have stayed constant (see Figure III-12).

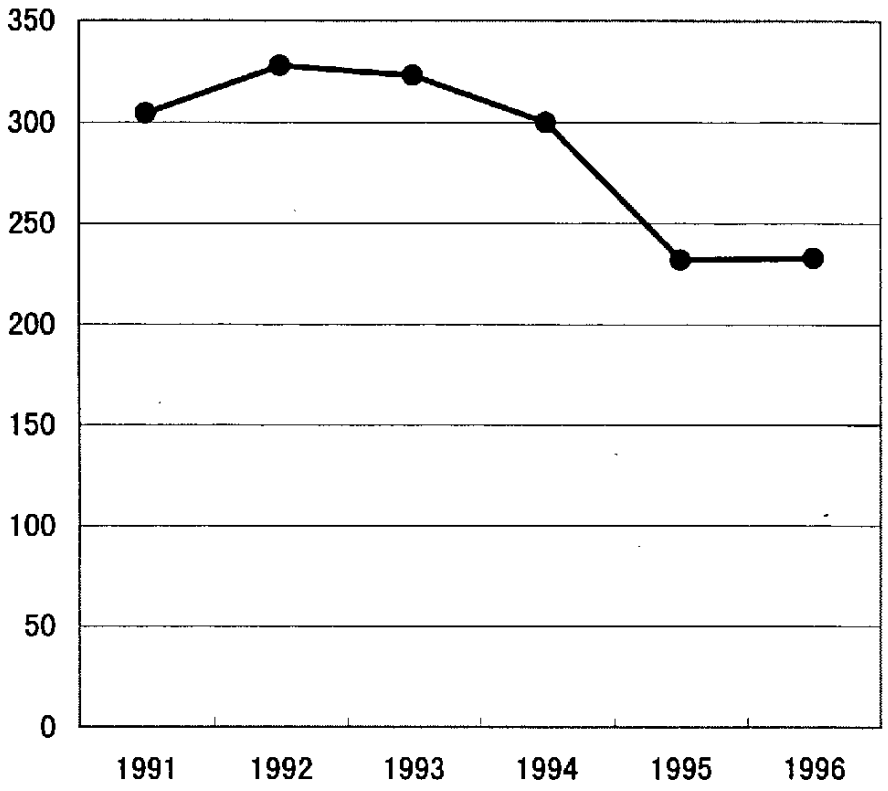
Figure III-11 Personal Computer Shipment (units)



	1991	1992	1993	1994	1995	1996
Personal Computer	3,033,927	3,014,891	3,078,364	3,747,206	6,382,177	8,965,629

Figure III-12 Price of a PC

Unit: Thousand Yen

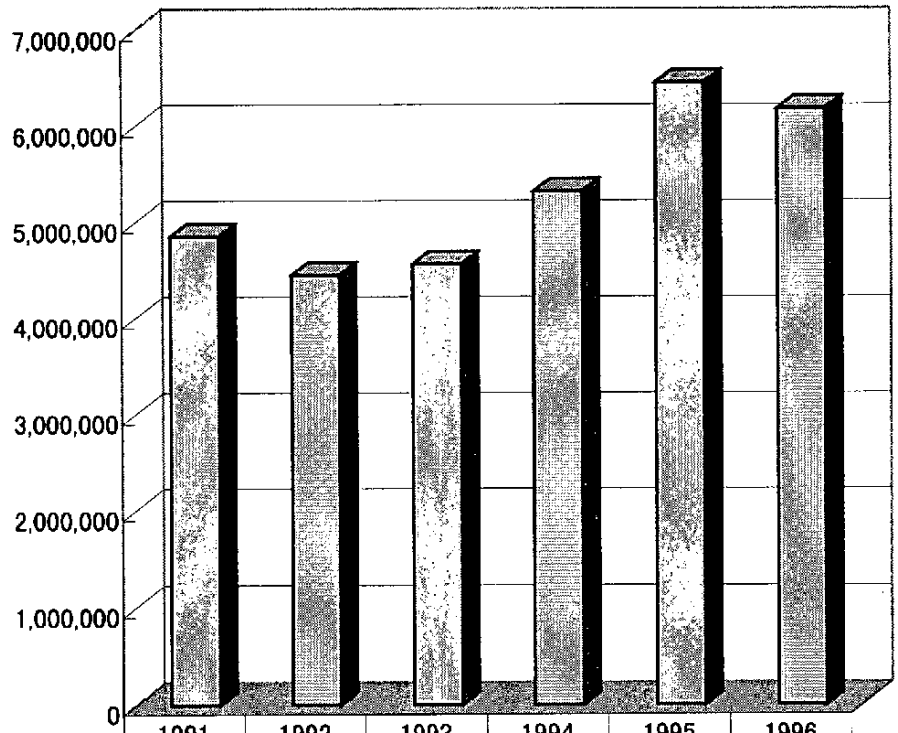


3. Electron Tubes, Semiconductors and Integrated Circuits

In 1996, electron tubes, semiconductors and integrated circuits worth ¥6,184,027 million were manufactured and shipped. The sum represented a decrease of 4.2 percent from the previous year (refer to Figure III-13).

Figure III-13 Revenue of Electron Tubes, Semiconductors and Integrated Circuits

Unit: Million Yen

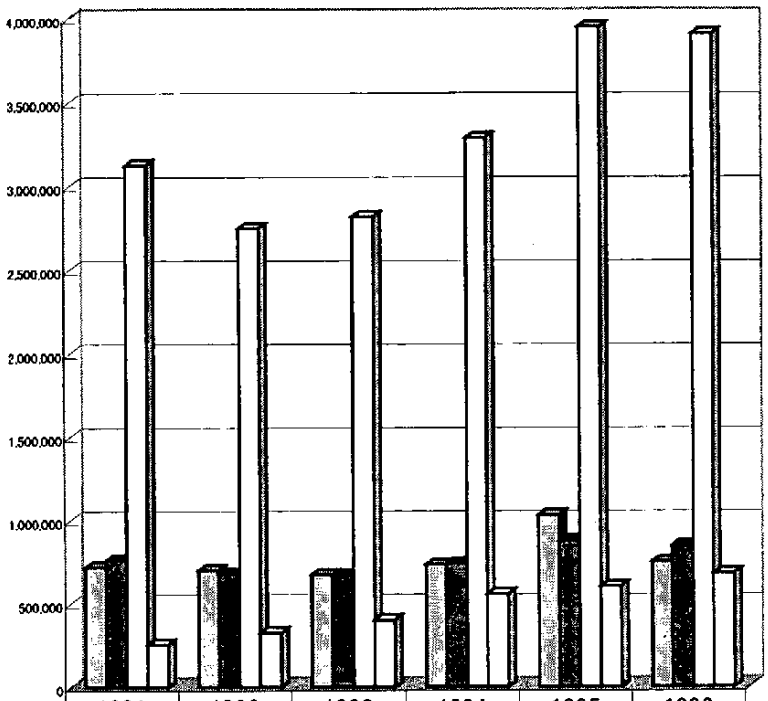


	1991	1992	1993	1994	1995	1996
Total Ship Value	4,860,510	4,455,117	4,564,947	5,321,550	6,456,223	6,184,027

Elctron tubes, semiconductors, integrated circuits and liquid crystal displays (LCD) device respectively accounted for ¥749,538 million, ¥846,767 million, ¥3,906,335 million and ¥681,386 million of this total. Values of electron tubes, semiconductors and integrated circuits manufacturers shipped in 1996 dropped by 27.2 percent, 3.6 percent and 1 percent, respectively. Meanwhile, the value of LCD devices manufactured and shipped in the same year achieved an year-to-year increase of 13.3 percent (see Figure III-14). Shipment of mass-produced integrated circuits is likely to remain stagnant because of intensifying competition from manufacturers in other Asian countries. Meanwhile, LCD devices have entered a period of high growth thanks to the increasing number of personal computer models adopting LCD. We can expect LCD devices to achieve high shipment growth for several years to come because Japan is leading the world in this technology.

Figure III-14 Revenue by Devices

Unit: Million Yen



	1991	1992	1993	1994	1995	1996
Electron Tube	718,645	701,661	673,080	734,971	1,030,275	749,539
Semiconductor Device	761,628	677,358	670,519	740,642	878,381	846,767
IC	3,125,198	2,750,502	2,819,224	3,288,530	3,946,280	3,906,335
LCD Device	255,039	325,596	402,124	557,407	601,287	681,386

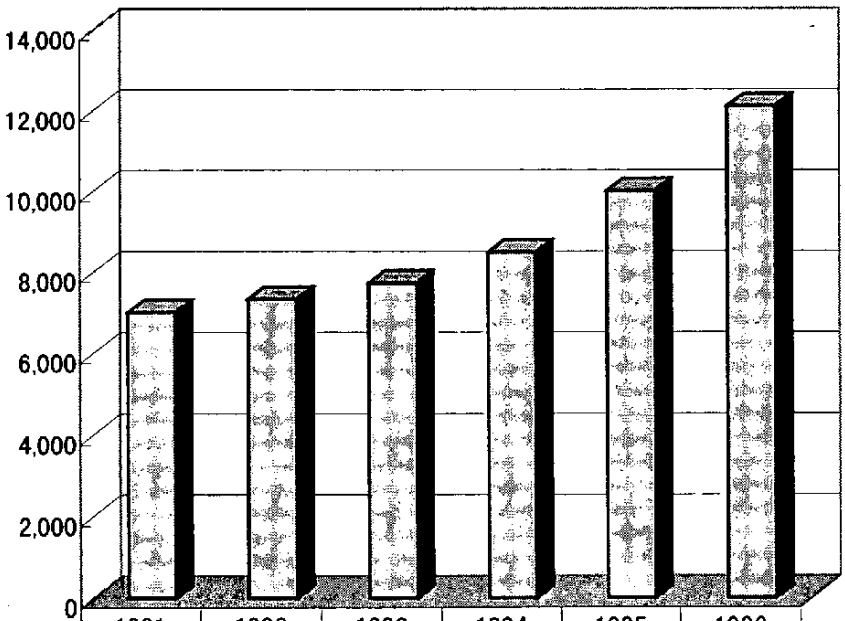
IV. Telecommunications Business

Statistical figures we present in this chapter are taken from a report titled "Developments in the Type I Telecommunications Business" the Ministry of Posts and Telecommunications (MPT) published in June 1997. These figures are annual totals calculated at the end of each fiscal year.

In fiscal 1996, telecommunications business achieved the sales of ¥12,135,100 million(see Figure IV-1).

Figure IV-1 Revenue of Telecommunications Carriers

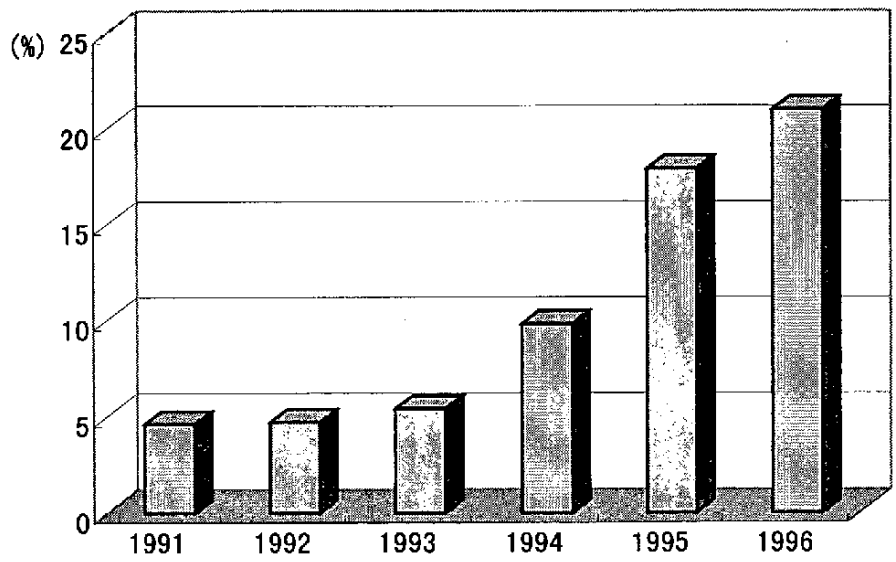
Unit: Billion Yen



	1991	1992	1993	1994	1995	1996
Total Revenue	7,020.4	7,351.4	7,747.4	8,508.5	10,028.9	12,135.3

This figure represented an increase of 21 percent from the previous year (refer to Figure IV-1). Nippon Telegraph and Telephone (NTT), mobile telephone carriers, domestic long-distance carriers, international carriers, regional carriers and satellite carriers respectively accounted for ¥6,371,200 million, ¥4,061,000 million, ¥1,045,600 million, ¥470,400 million, ¥148,500 million and ¥38,400 million of this total. NTT sold 2.2 percent more than it did in 1995. Mobile telephone carriers increased their sales by 70.7 percent. Domestic long-distance carriers registered an year-to-year sales growth of 14.9 percent. International carriers boosted their annual sales by 34.8 percent. Regional carriers increased their sales by 22.2 percent. Satellite carriers achieved sales growth of 9.7 precent. Telecommunications carriers have been achieving sales growth ratios in excess of 10 percent since 1994. Their sales growth ratios have stayed in the neighborhood of 20 percent since 1995 (see Figure IV-2).

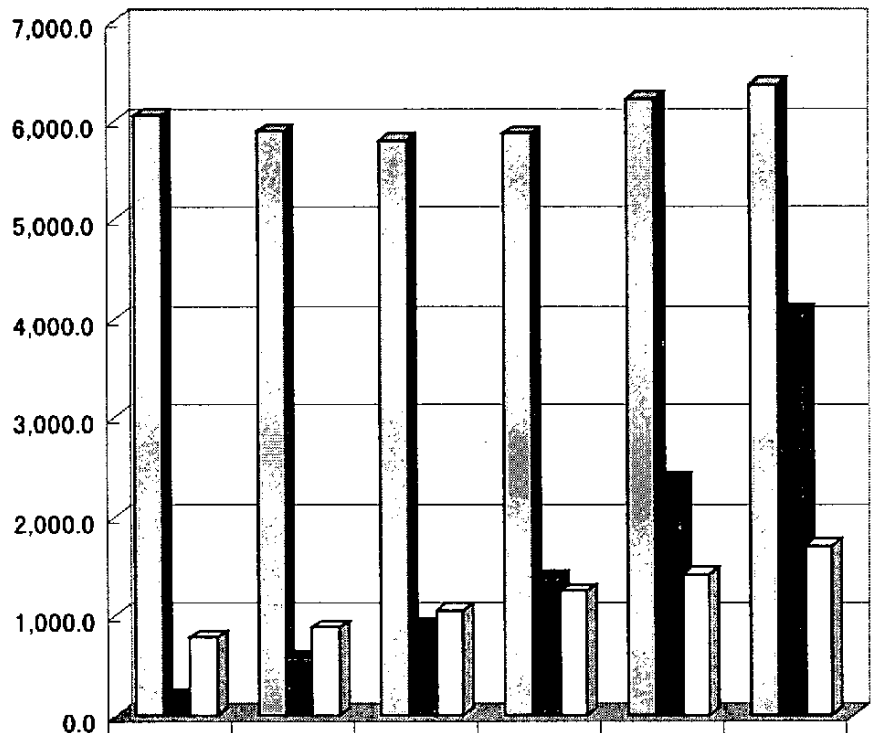
Figure IV-2 Increase over Previous Year of Telecommunications Market



It is clear that the high growth owes to expansion of the market for mobile telephones (refer to Figures IV-3 and IV-4). The market expansion pushed the ratio of telecommunications business to Japan's gross domstic product up to 2.42 percent in 1996 (see Figure IV-5).

Figure IV-3 Revenue of NTT & Other Carriers

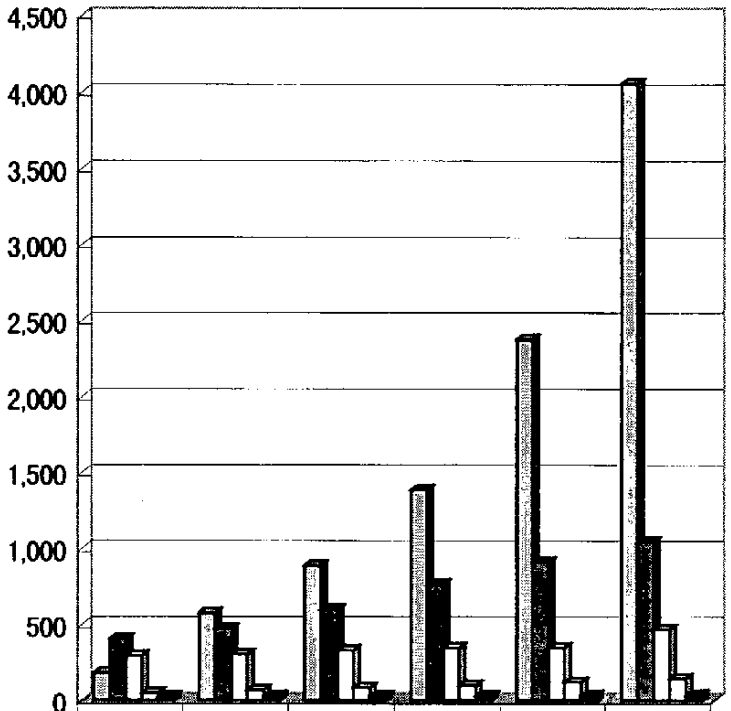
Unit: Billion Yen



	1991	1992	1993	1994	1995	1996
NTT	6,056.0	5,892.2	5,809.0	5,875.6	6,234.7	6,371.2
Mobile Carriers	182.3	576.0	888.1	1,386.7	2,379.0	4,061.0
Other Carriers	782.1	883.2	1,050.3	1,246.2	1,415.2	1,702.9

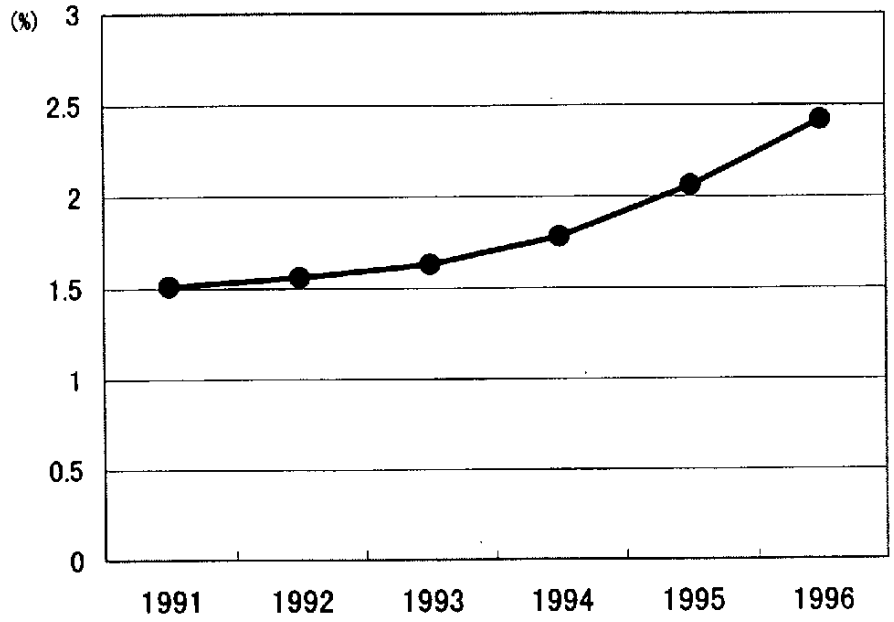
Figure IV-4 Revenue other than NTT

Unit: Billion Yen



	1991	1992	1993	1994	1995	1996
☐ Mobile Carriers	182.3	576.0	888.1	1,386.7	2,379.0	4,061.0
■ Long Distance Carriers	406.9	474.6	600.6	766.4	909.8	1,045.6
☐ International Carriers	296.2	308.4	332.6	344.7	348.9	470.4
☐ Local Carriers	53.3	69.1	85.5	103.1	121.5	148.5
■ Satelite Carriers	25.7	31.1	31.6	32.0	35.0	38.4

Figure IV-5 Telecommunications Industry in GDP



Following the settlement of the NTT division issue, all telephone carriers in Japan became able to offer both domestic and international call service. The move exposed international carriers to competition from the powerful rival, NTT. These carriers were previously protected by business restrictions. To cope with a new business environment, international carriers are actively working to establish business tieups with domestic carriers now. Japan Telecom, a domestic long-distance carrier, and Inernational Telecom Japan, an international carrier, announced their merger ahead of other companies exploring similar solutions in March 1997. Several mergers to the same effect are expected to follow suit in the near future. We can expect that intensifying competition will continue to bring telephone charges down and expand the market.

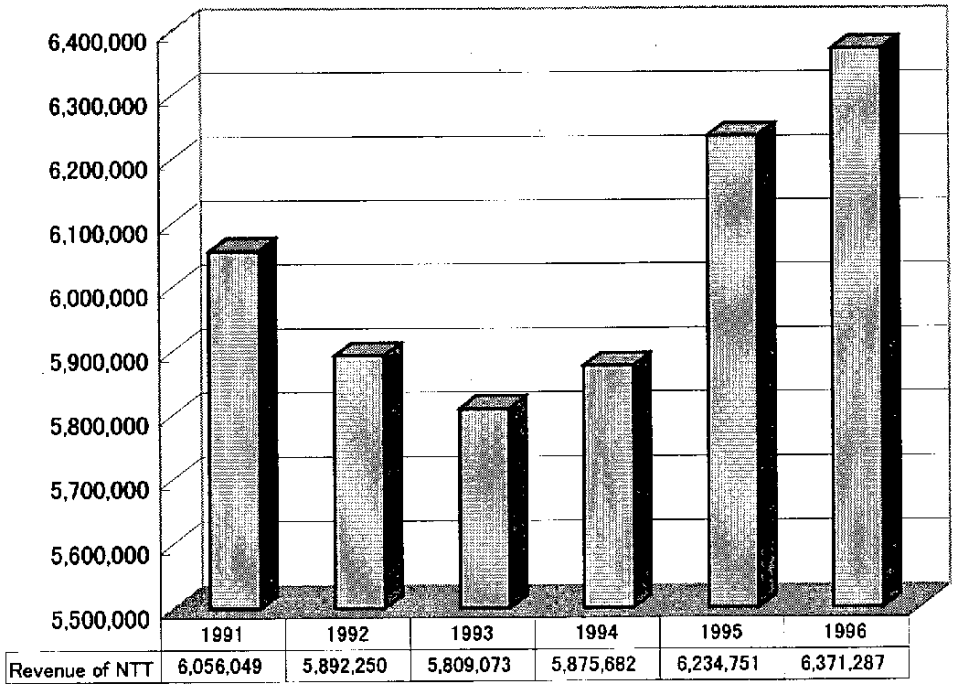
1. Nippon Telegraph and Telephone Corporation

In December 1996, the long-pending issue of NTT's division came to a conclusion. According to the conclusion, the company will be divided into four companies ; one long-distance operating campany and two regional phone operating companies will be placed under a single holding company in 1999.

NTT registered the sales of ¥6,371,200 million in fiscal 1996. The figure represented an year-to-year sales growth of 2.2 percent. The company boosted ordinary profits by 11.3 percent to ¥366,000 million (refer to Figure IV-6).

Figure IV-6 Revenue of NTT

Unit: Million Yen



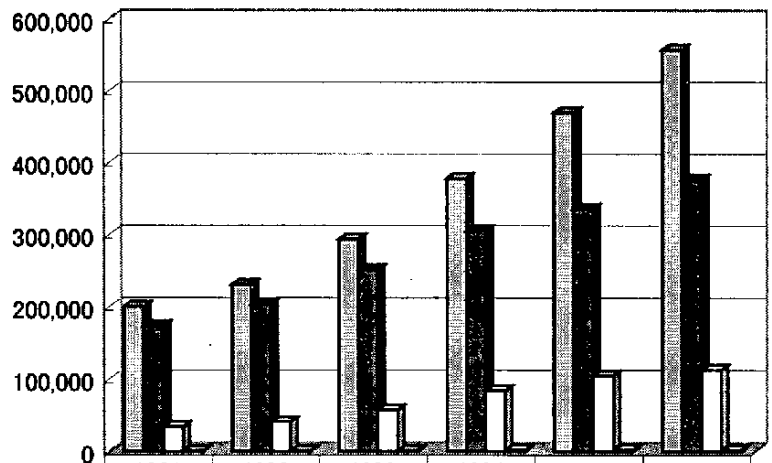
	1991	1992	1993	1994	1995	1996
Revenue of NTT	6,056,049	5,892,250	5,809,073	5,875,682	6,234,751	6,371,287

2. Other Domestic Carriers Excluding Mobile Telephone Carriers

Domestic carriers excluding NTT and mobile carriers achieved the sales of ¥1,045,600 million in 1996. The sum represented an increase of 14.9 percent from the previous year. DDI, Japan Telecom, Teleway Japan and regional carriers respectively accounted for ¥557,839 million, 375,855 million, 111,930 million and ¥148,500 million of this total. DDI's annual sales grew by 18.6 percent. Japan Telecom boosted its sales by 12 percent. Teleway Japan registered an year-to-year sales increase of 7.6 percent. Regional carriers pushed up their annual sales by 22.2 percent. All these regional carriers are owned by electric power companies(refer to Figure IV-7).

Figure IV-7 Revenue of Other Domestic Carriers Excluding Mobile Telephone Carriers

Unit: Million Yen



	1991	1992	1993	1994	1995	1996
DDI	199,832	230,711	293,458	377,868	470,281	557,839
JT	173,380	203,670	250,746	304,848	335,587	375,855
TWJ	33,780	40,277	56,398	83,726	103,946	111,930
Local Carriers	533	691	855	1,031	1,215	1,485

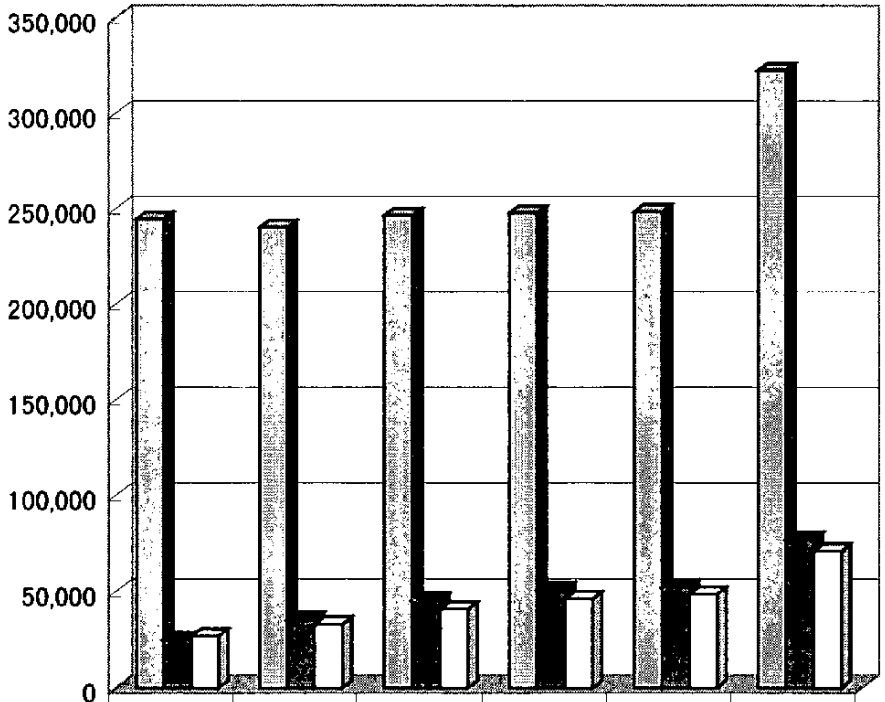
3. International Carriers

Sales registered by international carriers seem to have increased. But this is a false impression created by a new method for settling accounts. These companies began to register annual sales using pre-adjusted figures in fiscal 1996. Real sales growth is not as large.

In fiscal 1996, Kokusai Denshin Denwa (KDD) achieved the sales of ¥322,458 million. In the same year, International Digital Communications (IDC) and International Telecom Japan (ITJ) registered the sales of ¥77,041 million and ¥70,961 million, respectively (refer to Figure IV-8).

Figure IV-8 Revenue of International Carriers

Unit: Million Yen



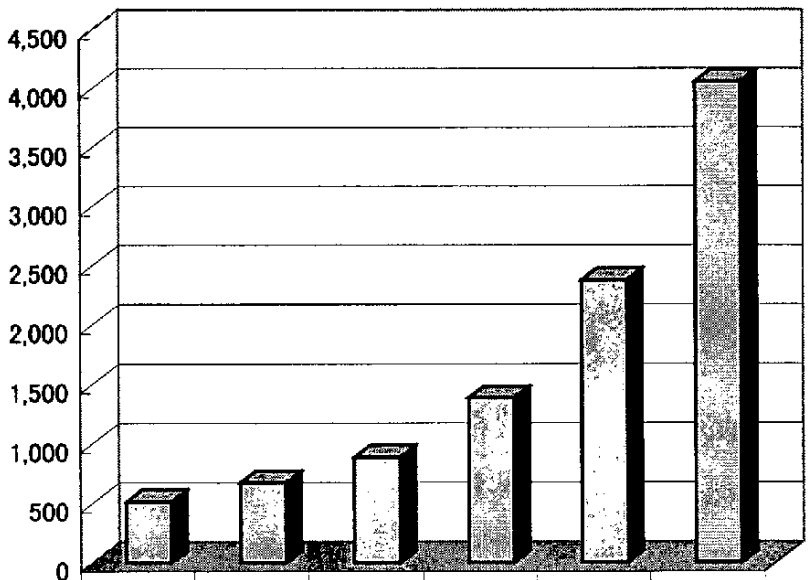
	1991	1992	1993	1994	1995	1996
KDD	244,491	240,098	246,409	247,898	248,333	322,458
IDC	25,048	35,340	45,308	50,668	52,326	77,041
ITJ	26,678	32,933	40,899	46,102	48,360	70,961

4. Mobile Telephone Carriers

In 1996, mobile telephone carriers achieved the sales of ¥4,061,000 million. The figure represented an increase of 70.7 percent from the previous year (see Figure IV-9). NTT DoCoMo, other cellular phone and pager service providers and PHS (personal handyphone system) service operators accounted for ¥2,033,900 million, ¥1,560,200 million and ¥459,000 million of this total, respectively. NTT DoCoMo increased its annual sales by 59.8 percent. Other cellular telephone and pager service operators achieved an year-to-year sales growth of 62.1 percent (refer to Figure IV-10). Providers launched PHS service in July 1995.

Figure IV-9 Revenue of Mobile Communications Carriers

Unit: Billion Yen

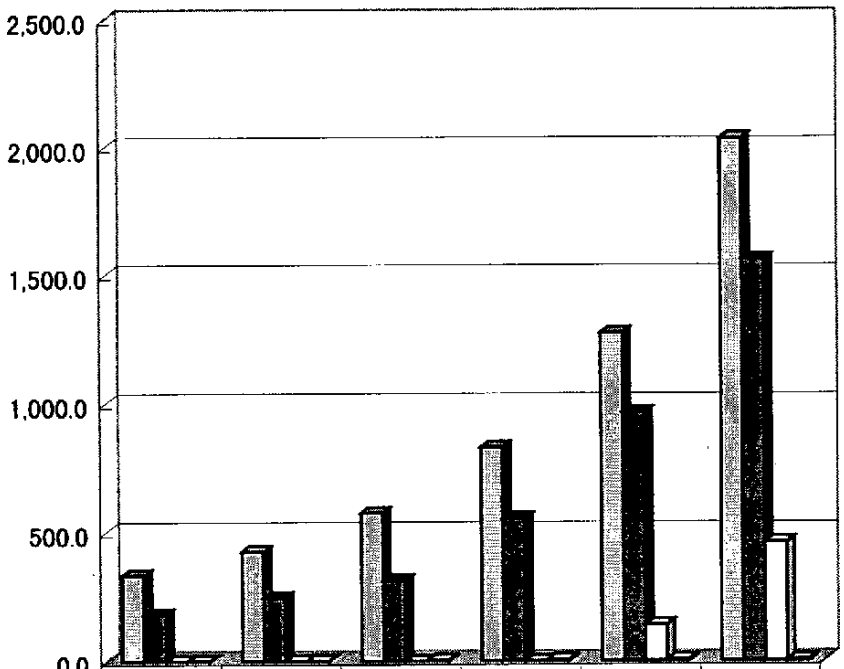


	1991	1992	1993	1994	1995	1996
Revenue of Mobile Communications	514.7	673.3	888.1	1,386.7	2,379.0	4,061.0

As we have repeatedly pointed out, the ratio of year-to-year sales growth began to increase at an amazing pace in 1994 (refer to Figures III-1, III-4 and III-5). In 1995 and 1996, the ratio surpassed 70 percent (see Figure IV-11). However, the penetration rate of mobile telephone has already exceeded 20 percent. This situation suggests we cannot expect mobile telephone service providers to repeat the same big growth in fiscal 1997. From now on, sales registered by mobile telephone service providers are expected to increase at a moderate pace.

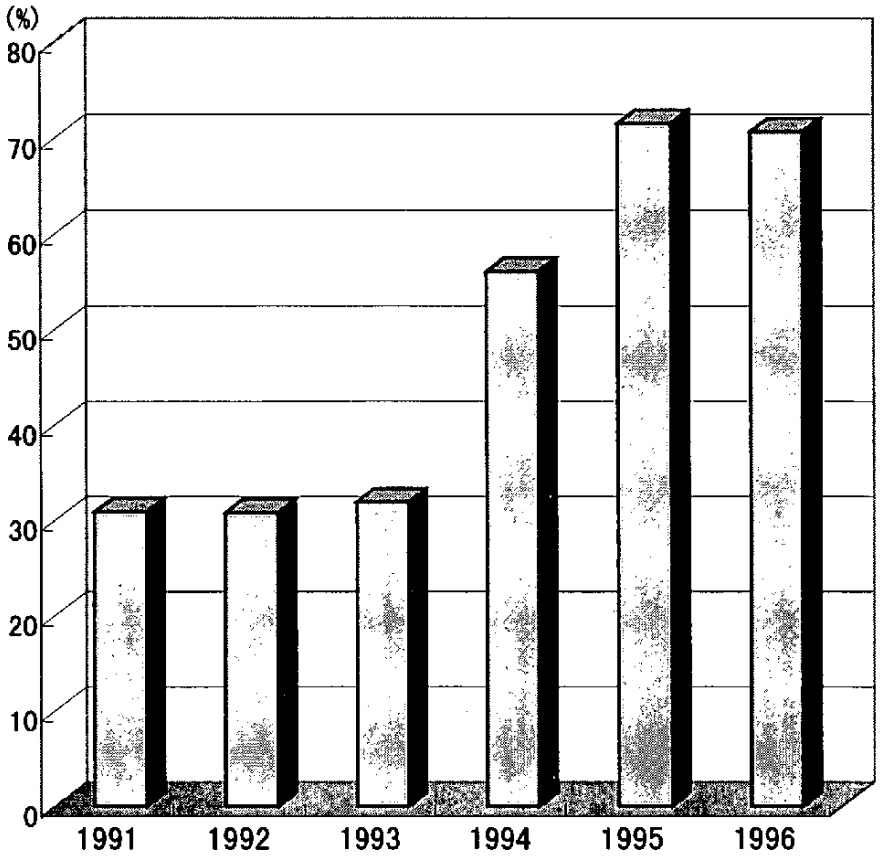
Figure IV-10 Revenue by Mobile Carriers

Unit: Billion Yen



	1991	1992	1993	1994	1995	1996
NTT DoCoMo	332.4	425.4	574.0	829.4	1,272.7	2,033.9
Other Carriers	181.2	246.1	310.8	551.7	962.6	1,560.2
PHS Carriers	0.0	0.0	0.0	0.0	138.2	459.0
Others	1.1	1.7	3.1	5.5	5.3	5.6

Figure IV-11 Increase Over Previous Year of Mobile Market



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